

**PREVENTION OF
MOTHER-TO-CHILD TRANSMISSION
OF HIV IN ASIA**

PRACTICAL GUIDANCE FOR PROGRAMS



PREVENTION OF MOTHER-TO-CHILD TRANSMISSION OF HIV IN ASIA: PRACTICAL GUIDANCE FOR PROGRAMS

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ACRONYMS

AIDS	acquired immunodeficiency syndrome
ANC	antenatal care
ARI	acute respiratory infection
ARV	antiretroviral
AZT	azidothymidine (zidovudine or ZDV)
BCC	behavior change communication
BFHI	Baby Friendly Hospital Initiative
BMS	breastmilk substitutes
CDC	Centers for Disease Control and Prevention
CDD	control of diarrheal diseases
CPR	contraceptive prevalence rate
CSW	commercial sex worker
DOTS	directly observed treatment (short course)
EPI	Expanded Programme on Immunization
FP	family planning
HAART	highly active antiretroviral therapy
HIV	human immunodeficiency virus
HSS	HIV Sentinel Surveillance
ICAAP	International Conference on AIDS in Asia and the Pacific
IDU	intravenous drug user
IMCI	Integrated Management of Childhood Illness
MCH	maternal and child health
MSM	men who have sex with men
MTCT	mother-to-child transmission
NACO	National AIDS Control Organization (India)
NGO	non-governmental organization
NMCHC	National Maternal and Child Health Center
NNRTIs	nonnucleoside reverse transcriptase inhibitors
NVP	nevirapine
PCR	polymerase chain reaction (test)
PMTCT	prevention of mother-to-child transmission
STD	sexually transmitted disease
STI	sexually transmitted infection
TB	tuberculosis
TBA	traditional birth attendant
UNAIDS	Joint United Nations Programme on HIV/AIDS
UNICEF	United Nations Children's Fund
USAID	United States Agency for International Development
VCT	voluntary counseling and testing
WHA	World Health Assembly
WHO	World Health Organization
ZDV	zidovudine (azidothymidine or AZT)

EXECUTIVE SUMMARY

A number of countries in Asia are experiencing rapidly growing HIV/AIDS¹ epidemics. As the epidemics move from the groups first affected² to women of reproductive age, increasing numbers of infants are becoming infected with HIV through mother-to-child transmission (MTCT). With two notable exceptions—Thailand and Cambodia—most countries in the region are experiencing rising numbers of pediatric AIDS cases and have little experience with programs to prevent transmission. Thailand and Cambodia have been seriously affected by HIV/AIDS, but have implemented aggressive prevention programs and are now experiencing declines in adult and pediatric HIV infection.

Effective prevention of MTCT requires a three-pronged approach: preventing infection in women of reproductive age; preventing unwanted pregnancies in HIV-infected women; and offering MTCT prevention interventions to women who are both HIV-infected and pregnant. This paper focuses on the third prong. It reviews the technical dimensions of MTCT (including mechanisms, timing, and risk factors); discusses issues around the diagnosis and treatment of pediatric AIDS; and describes programmatic issues and experience in Asia and elsewhere with the following five core interventions to prevent MTCT (PMTCT):

- Comprehensive maternal and child health (MCH) services
- Voluntary counseling and testing (VCT)
- Antiretroviral (ARV) prophylaxis
- Counseling and support for safe infant feeding
- Optimal obstetric practices

Medical care and social support for the mother and the infant living with HIV/AIDS are an important part of the prevention-to-care continuum and are also discussed. Operational issues encountered in developing PMTCT programs, such as assessment of the situation, planning through dialogue, monitoring and evaluation, and understanding policy concerns, are outlined.

This paper focuses on the five most affected countries in the region—Cambodia, China, India, Myanmar, and Thailand—but the technical background presented and lessons learned from these five countries are relevant for the rest of the region. The paper is intended for use as a technical resource, a programmatic guide, and a basis for policy dialogue and coordination. It includes recommendations on how to move forward in PMTCT programs to governments, non-governmental organizations, and other partner organizations joined in the effort to prevent the spread of HIV/AIDS in Asia.

¹ Human immunodeficiency virus/acquired immunodeficiency syndrome.

² These include intravenous drug users (IDUs), commercial sex workers (CSWs), and men who have sex with men (MSM).

I. INTRODUCTION

Since the XIII International AIDS Conference held in Durban, South Africa, in July, 2000, there has been a dramatic increase in global political and programmatic commitment to the prevention of mother-to-child transmission (PMTCT) worldwide. This commitment is best evidenced by recent statements at the United Nations General Assembly (see box, "United Nations General Assembly Statement on HIV/AIDS below"); by the formation of the Global Fund to Fight AIDS, Malaria, and Tuberculosis; and by the expansion of PMTCT pilot programs in many developing countries, including implementation of national MTCT prevention programs in Thailand, Botswana, and Uganda.

The United States Agency for International Development (USAID), one of the major international donors in the field of HIV/AIDS prevention, also declared prevention of MTCT as one of the cornerstones of its Expanded Response to HIV/AIDS. The agency pledged, in concert with its partners, to "ensure that at least 25 percent of HIV/AIDS infected mothers in high prevalence countries have access to interventions to reduce HIV transmission to their infants" (USAID, 2001).

UNITED NATIONS GENERAL ASSEMBLY STATEMENT ON HIV/AIDS

As part of the Twenty-sixth special session held on HIV/AIDS at the United Nations General Assembly in June, 2001, the Heads of State and other government representatives attending, pledged:
"By 2005, reduce the proportion of infants infected with HIV by 20 per cent, and by 50 per cent by 2010, by: ensuring that 80 per cent of pregnant women accessing antenatal care have information, counseling and other HIV prevention services available to them, increasing the availability of and by providing access for HIV-infected women and babies to effective treatment to reduce mother-to-child transmission of HIV, as well as through effective interventions for HIV-infected women, including voluntary and confidential counselling and testing, access to treatment, especially anti-retroviral therapy and, where appropriate, breast milk substitutes and the provision of a continuum of care..."
 (United Nations General Assembly, 2001).

The relatively low prevalence of MTCT in Asia³ has contributed to making PMTCT implementation a low priority to date in most countries of the region (with the exception of Thailand). However, the epidemiological pattern is changing in many Asian countries, and HIV transmission from mothers to infants has become a more visible problem. Until recently, the perceived complexity and expense of delivering PMTCT interventions has also contributed to inaction. However, knowledge and technology for MTCT prevention have changed dramatically over the last five years, and wide-scale implementation has become more feasible and affordable. This new knowledge and technology includes the availability of rapid and less expensive HIV tests; identification of simple, effective, and affordable antiretroviral drugs (ARV) for MTCT prophylaxis; and recognition of modifiable obstetric and postnatal practices that may reduce infant exposure to HIV during delivery and breastfeeding.

The Asia region is characterized by highly diverse epidemiological patterns of HIV within and among countries. Five of the most HIV-affected countries in Asia—Cambodia, China, India, Myanmar, and Thailand—feature prominently in this paper.

The Asian region also varies widely in terms of the availability of financial and human resources and the health system infrastructures available to address prevention of MTCT. As such, the PMTCT intervention packages that can be offered vary significantly, with Thailand the most advanced in the Asian region in terms of AIDS prevention efforts in general, and MTCT prevention in particular. The fact that the prevalence of antenatal HIV is still relatively low in most of Asia may actually *increase* the feasibility of introducing PMTCT programs, even in poor settings in Asia. This situation contrasts

³ Unless otherwise noted, all references to Asia in this paper include developing countries in South and South East Asia, East Asia, and the Pacific. The HIV/AIDS problems of industrialized countries of Asia are not addressed in this paper.

with the situation in many East and Southern African settings where more than one-fifth of all pregnant women are HIV-infected (Preble and Piwoz, 2001).

In Asian countries with generous technical and financial resources, MTCT can be reduced to negligible levels, as has occurred in the United States, Australia, and Europe. However, Asian countries with more modest resource levels can still make significant reductions in their MTCT rates by introducing the interventions described in this paper.

A three-pronged approach to MTCT prevention is recommended: preventing infection in women of reproductive age; preventing unwanted pregnancies in HIV-infected women; and offering MTCT prevention interventions to women who are both HIV-infected and pregnant. In addition, it is important to link all types of HIV/AIDS prevention efforts (including MTCT prevention) with appropriate medical treatment and social support for infants and mothers living with HIV/AIDS. Table 1 outlines these relationships, which constitute a prevention-to-care continuum.

TABLE 1: MTCT and the prevention-to-care continuum

Primary Prevention of HIV/Aids in Women (and Men)	Prevention of Unwanted Pregnancy in HIV-Infected Women	Interventions for Prevention of MTCT from HIV-Infected Women	Care and Support for HIV-Infected Infants & Women
<ul style="list-style-type: none"> • Promotion of safe sexual behavior by: <ul style="list-style-type: none"> • Promotion and provision of condoms • Behavior change communication for individuals, partners, families, communities, and youth • Prevention and treatment of sexually transmitted diseases • VCT and premarital counseling and testing 	<ul style="list-style-type: none"> • Offering VCT to pregnant women • Offering safe, effective, voluntary FP to HIV-infected women • Offering voluntary abortion services to HIV-infected women where legal 	<ul style="list-style-type: none"> • Comprehensive MCH services • VCT • ARV prophylaxis • Counseling and support for safe infant feeding • Optimal obstetric practices 	<ul style="list-style-type: none"> • Postpartum care for mothers (including family planning) • Postpartum care for infants (including identification, treatment of, and palliative care for AIDS-related conditions) • Social support for families and communities affected by HIV/AIDS, especially orphans and vulnerable children

This paper describes five core interventions for preventing MTCT in resource-constrained settings common in Asia (column 3 of the continuum). These interventions include: 1) comprehensive maternal and child health services; 2) voluntary counseling and testing; 3) antiretroviral prophylaxis; 4) counseling and support for safe infant feeding; and 5) optimal obstetric practices. These interventions are increasingly recognized as having a broader impact on maternal and child health beyond prevention of MTCT. Their implementation may contribute to reductions in non-HIV-related morbidity and mortality in infants and mothers alike.

II. THE HIV/AIDS EPIDEMIC IN ASIA TODAY

A. HIV/AIDS in Asian Adults

The HIV/AIDS epidemic began in Asia in the late 1980s, considerably later than in Africa, but the epidemic has already spread rapidly in some countries. By the end of 2001, an estimated 7.1 million adults and children in South and South East Asia and the Pacific were living with HIV/AIDS. Of this total, 1.07 million were newly infected with HIV during 2001, and over 400,000 HIV/AIDS-related deaths had occurred in that year alone. Between 20 percent and 35 percent of infected adults were women. While the average overall adult infection rate in Asia appears low—about 1 percent—epidemiologists caution that national rates may a) mask uneven geographical spread, b) not adequately represent the impact of special high-risk groups, and c) underestimate the scope of the epidemic in very large countries such as China, India, and Indonesia⁴ (MAP, 2001). WHO warns that in seriously affected Asian countries, total annual adult deaths in the coming decade will increase by up to 40 percent due to deaths from AIDS (WHO, 2001a).

Several Asian countries currently have what are often referred to as “concentrated epidemics”. Countries with concentrated epidemics usually have high rates of HIV in specific risk groups, including intravenous drug users (IDUs), men who have sex with men (MSMs), and commercial sex workers (CSWs). The concept of a concentrated epidemic is important for AIDS prevention program planning because many experts maintain that, in these epidemiological environments, prevention interventions targeted to these risk groups are the most effective first step to avoid the spread of HIV into the general population. Once HIV becomes less “concentrated” and enters the general population, heterosexual transmission becomes the major mode of transmission. When this happens, the ratio of male to female HIV infections approaches 1:1. As the prevalence of HIV infection in women of reproductive age increases, MTCT becomes a greater problem in the population.

Routes of transmission of HIV, and their relative importance in the pandemic, vary among geographic areas and over time. In Asia, HIV continues to be spread initially by the following behaviors: needle sharing among IDUs, unprotected sex between clients and CSWs, and unprotected sex between men (UNAIDS/WHO, 2001). HIV-infected IDUs can serve as a bridge to the heterosexual population through their sexual contacts with women. Many MSM in Asia are bisexual, and therefore also expose women to HIV. One exception to this pattern of high-risk groups appears in parts of China, where HIV was spread through the population by unsafe blood collection practices.

As noted in the Introduction, the HIV/AIDS epidemic in Asia varies greatly within and between countries in the region. WHO has identified three categories of countries in Asia in terms of the prevalence of HIV in their 15–49 year old populations:

- high HIV prevalence countries (prevalence of more than 1 percent)
- moderate HIV prevalence countries (prevalence of between 0.1 and 1 percent)
- low HIV prevalence countries (prevalence of less than 0.1 percent)

Anonymous seroprevalence surveillance in antenatal clinic attendees is often used to monitor the

⁴ For example, in 1999, the populations of China, India and Indonesia were 1,266,838,000; 998,056,000; and 209,255,000, respectively (UNICEF, 2001a).

spread of HIV in the general population⁵. These data suggest that the HIV epidemic is already serious in Cambodia, Myanmar, Thailand, and parts of China and India where 2 to 5 percent of pregnant women are HIV-infected.

Selected data on the countries discussed in this paper are found in Table 2. Data on additional Asian countries are found in Annex A.

Table 2: Characteristics of HIV/AIDS in five seriously-affected, resource-poor countries in Asia

COUNTRIES BY CATEGORY	TOTAL POPULATION (000s) in 1999	EST. ADULT HIV+ RATES		MAJOR ROUTES OF TRANSMISSION			EST. HIV+ RATES IN FEMALE ANTE-NATAL CLINIC ATTENDEES (MEDIAN IN 1999)		EST. NO. OF WOMEN 15-49 LIVING WITH HIV/AIDS
		%	Year	HET	MSM	IDU	In major urban areas	Outside major urban areas	
Cambodia	10,945	2.77	2000	+++	-	-	3.8	2.3	71,000
Myanmar	45,059	1.99	1999	+++	-	++	0.65	1.5	180,000
Thailand	60,856	1.85	2001	+++	-	++	1.28	1.71	305,000
India	998,056	0.75	2000	++	-	+	2.0	0.3	1,300,000
China	1,266,838	0.08	2000	-	-	+++	n/a	0.4	4,800

HET: heterosexual transmission

MSM: men who have sex with men

IDU: intravenous drug user

- : unknown or minimal HIV transmission

+ : limited HIV transmission

++ : moderate HIV transmission

+++ : major HIV transmission

Additional highlights on the HIV epidemics in Asia are presented below:

- In **Cambodia**, the national HIV infection rate in antenatal clinic attendees increased rapidly until 1997, when it appears to have peaked at a rate of 3.2 percent. In 1999, the rate was 2.6 percent, and in 2000, 2.3 percent. While this apparent decline is encouraging at the national level, the rates within some provinces remain extremely high. For example, in 2000, five provinces recorded seroprevalence rates of 4 percent or above (Kampong Speu Province, 4.0 percent; Takeo Province, 4.1 percent; Banteay Meanchey Province, 4.7 percent; Koh Kong Province, 5.0 percent; and Siem Reap Province, 5.7 percent) (Ministry of Health, National Center for HIV/AIDS, Dermatology and STD, 2001).
- Few systematic surveillance data from **China** are available, but there are strong indications that serious epidemics already exist in certain parts of the country. HIV infection is concentrated, to date, in IDUs, CSWs, and in the general adult populations of villages that engaged in unsafe

⁵ However, some epidemiologists have taken issue recently with the use of ANC attendees as proxies for estimating HIV in the general population, maintaining that the level of fertility of HIV-positive women aged 25 years and above is significantly lower than for HIV-negative women. They contend that HIV-positive women in this age group are likely to be underrepresented among antenatal clinic attendees, and these epidemiologists recommend adjusting ANC-based HIV sentinel surveillance data accordingly (Yaro et al., 2001).

blood-selling practices in the past⁶. The official Chinese government estimate of the number of people living with HIV/AIDS in 2000 is 600,000. However, UNAIDS estimates that the number could actually be well over 1 million for the year 2000, and could increase to 5 million by 2005, and 20 million by 2010 (China UN Theme Group on HIV/AIDS, 2001). There are already signs of heterosexual HIV transmission in at least three provinces (Yunnan, Guangxi, and Guangdong), with HIV rates reaching 4.6 percent in Yunnan and 10.7 percent in Guangxi (UNAIDS/WHO, 2001). Furthermore, MTCT cases have been reported in Yunnan, Guangxi, Xingjiang, and Henan provinces (China UN Theme Group on HIV/AIDS, 2001).

- With a total population of one-half billion in the age group 15-49, the HIV epidemic in **India** will have a major impact on the overall spread of HIV in the region. Currently, about 21 percent of all HIV infections in India are among women of reproductive age. MTCT accounts for less than 1 percent of all HIV infections (0.73 percent); nevertheless, because of the large population, approximately 32,000 children are infected with HIV each year (UNICEF EAPRO, 2001), a number comparable to the hardest-hit countries of Africa. The most affected states are Andhra Pradesh, Karnataka, Maharashtra, and Tamil Nadu in the South, and Manipur in the Northeast (WHO, 2001a). Year 2000 seroprevalence data indicate that in these five states, more than 1 percent of antenatal women are already HIV-infected (NACO, India, 2001).
- In **Myanmar**, HIV sentinel surveillance began in 1992 in antenatal clinic attendees. HIV prevalence in this group in Rangoon (now Yangon) and Mandalay (the two largest cities) increased from no evidence of infection in 1992 and 1993, to 0.8 percent in 1995. HIV prevalence remained below 1 percent through 1997. At that time, HIV antenatal infection rates reached 1.5 percent in 13 sites outside of major urban cities (UNAIDS/WHO, 2000). In 1999, the antenatal HIV prevalence rate in sentinel surveillance sites had risen to 2.65 percent.
- In **Thailand**, AIDS is now the leading cause of death, surpassing accidents, heart disease, and cancer. While there are encouraging signs that seroprevalence levels may have already peaked and stabilized in Thailand due to aggressive prevention efforts and strong political commitment, the HIV/AIDS situation remains serious. Today, one-in-60 Thais is infected with HIV, and there are indications that transmission between spouses is now responsible for more than half of new infections (UNAIDS/WHO, 2001), raising concern about MTCT. It is currently estimated that 951,000 adults and 33,000 children have been infected with HIV since the start of the epidemic. Of these, 289,000 have already died, and 55,000 were expected to require medical care for AIDS-related illnesses in 2001 (WHO, 2001a).

Other developing countries in Asia have seen only limited spread of HIV to date, but there is no guarantee that HIV rates will stay low, and there is every indication that they will increase unless prevention programs are put into place quickly. For example:

- In **Papua New Guinea**, the total number of HIV cases reported for the year 2000 (970) was 16 percent higher than the number reported in 1999 (815). The proportion of HIV cases due to MTCT had more than doubled over a two-year period, from 4 percent in 1998 to 9 percent in 2000 (Malau, 2001).

⁶ The extent to which MTCT will be a concern in these villages will depend in large part on whether these rural women had already completed their permitted "2 child family" at the time they began selling blood plasma.

- In **Vietnam**, a review of national HIV case reports and sentinel surveillance data from 21 provinces suggested that HIV infection in IDUs had increased significantly in 14 provinces, and rates in CSWs had increased in six provinces. Although the data indicated a slow spread outside these high-risk groups, the authors of this report recommended immediate, intensive prevention efforts in high-risk groups to decrease expansion to the broader population (Quan et al., 2000).
- In many parts of **Indonesia**, rates of infection among CSWs and IDUs have risen rapidly in the past two years, after remaining relatively low throughout the 1990s. For example, in 1999-2000, HIV seroprevalence in IDUs was estimated to be 15 percent. By 2001, 40 percent of injectors in treatment programs in Jakarta were already infected (UNAIDS/WHO, 2001).

The primary strain of HIV in Asia is HIV-1⁷, and all references to HIV in this paper refer to HIV-1, unless otherwise noted. Transmission of HIV-2 is less efficient, or virulent, than HIV-1 in terms of sexual transmission and especially with regard to MTCT. Only about 1 percent of HIV-2 infected mothers pass on the infection to their offspring (Grant and de Cock, 2000; Essex, 1999) as opposed to 25-45 percent in women infected with HIV-1.

B. HIV/AIDS in Asian Infants and Children

Infants and children in developing countries are affected by HIV/AIDS in multiple ways, suffering severe social, health, economic, and psychological consequences (Connolly et al., 1998). Those perhaps most directly affected, however, are children who acquire HIV/AIDS through MTCT. They face severe morbidity and a near-certain early death where sophisticated and costly treatments are virtually nonexistent, and even the availability of basic medicines to treat opportunistic infections is likely to be erratic. There is still no cure for (adult or) pediatric HIV/AIDS.

Pediatric AIDS is still relatively rare in Asia, but will become a growing problem in countries where a large number of women of reproductive age are infected with HIV. Over 200,000 Asian children under age 15 were living with HIV/AIDS at the end of 2001; an estimated 68,000 were infected with HIV during 2001 alone, and more than 40,000 deaths from HIV/AIDS occurred during 2001 (UNAIDS/WHO, 2001). Almost all AIDS deaths in young children can be traced back to MTCT. Country-specific estimates of Asian children living with HIV/AIDS and dying from AIDS are found in Annex B.

In Asian countries with relatively low rates of adult HIV infection, several factors have prevented large absolute numbers of pediatric AIDS cases to date, including high male-female ratios of HIV infection, with most HIV infections still occurring in male IDU and MSM, and relatively low fertility rates (compared with those of Africa). If this pattern prevails, the number of pediatric AIDS cases and maternal AIDS orphans could remain low (WHO, 2001a).

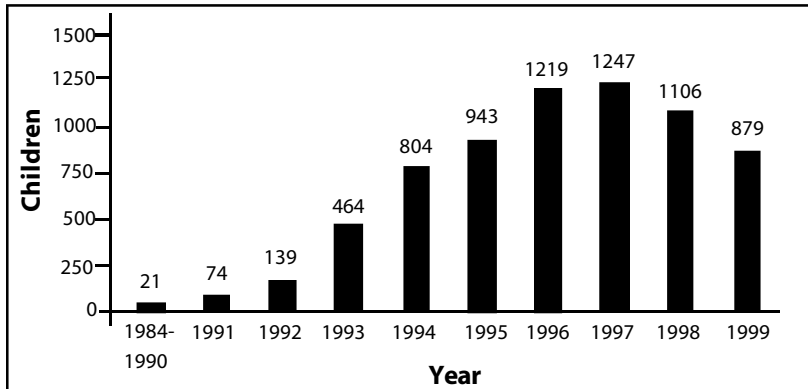
Where pediatric AIDS *does* emerge, it will contribute to child morbidity and mortality, and could undermine the impact of programs that have significantly reduced child mortality in previous decades (U.S. Bureau of the Census, 1999; Connolly et al., 1998).

Thailand has shown encouraging trends in slowing the growth of HIV in women because of aggressive government prevention efforts, including the 100 percent condom program, as well as programs to identify HIV-infected pregnant women and provide them with MTCT prevention services.

⁷ India has detected increasing rates of HIV-2 (Halani et al., 2001; Kamat et al., 2000), but HIV-1 is still dominant. A recent study in Thailand was unable to confirm a single case of HIV-2 infection (Chanbancherd et al., 2000).

Figure 1 uses Ministry of Health data to illustrate the decline in MTCT-related AIDS cases in children in Thailand between 1984 and 1999.

Figure 1: AIDS cases in children 0-4 years from mother-to-child transmission, Thailand, 1984-1999



Source: Ministry of Public Health, Thailand

III. MTCT: A SUMMARY OF THE TECHNICAL BACKGROUND

A. Mechanisms, timing, and risk factors

MTCT is the result of a chain of events that most often involves an HIV-infected man infecting his female partner through unprotected sexual activity, and the partner infecting her next baby, and potentially subsequent babies, during the remainder of her reproductive life. To reflect the important role of men in this chain of transmission, some organizations have replaced the biologically precise terminology, “mother-to-child transmission” with the more behaviorally sensitive terminology, “parent-to-child transmission.”

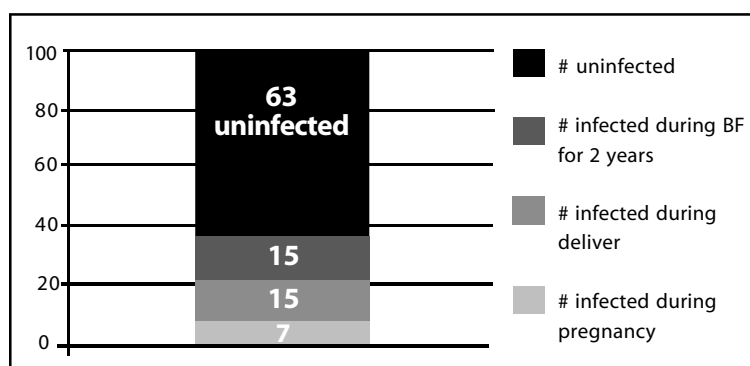
In industrialized countries such as the United States, MTCT rates have fallen to as low as 1-2 percent of births among HIV-infected mothers in recent years, due to the wide-scale introduction of several interventions: combination treatment of HIV-infected women, HIV counseling and testing, short-course zidovudine (ZDV or AZT) prophylaxis, elective cesarean delivery, and the safe use of infant formula instead of breastfeeding (Mofenson and McIntyre, 2000; Lepage and Hainaut, 2000; CDC, 2001a). In the United States, between 1997 and 1999 alone, perinatally acquired AIDS cases declined by 66 percent (CDC, 2001a), so elimination of perinatal transmission of HIV is a feasible goal in that setting (Lepage and Hainaut, 2000).

In Asian countries where interventions to prevent MTCT have not been available at all, and where breastfeeding into the second year of life is normal practice, between 25 and 45 percent of HIV-infected mothers will pass on HIV to their infants (Working Group on Mother-to-Child Transmission of HIV, 1995) during pregnancy, during labor and delivery, or after birth through breastfeeding. The risk of infection is now thought to be 5 to 10 percent during pregnancy; 10 to 20 percent during labor and delivery; and 10 to 20 percent if the child is breastfed for two years (De Cock et al, 2000).

In populations where women do *not* breastfeed, most HIV transmission occurs during labor and delivery. This is illustrated by data from Thailand, where transmission around the time of childbirth accounted for 75 percent of all infant infections in a prospective study of 218 nonbreastfeeding infants (Mock et al., 1999). The remaining infections occurred during pregnancy. On the other hand, when sustained breastfeeding is practiced, it accounts for one-third to one-half of all infant infections when no other interventions to prevention transmission are available.

The number of infants who become infected with HIV during different time periods is illustrated in Figure 2 for 100 HIV-positive mothers who receive no special interventions to reduce transmission. Even with no intervention, approximately two-thirds of all infants born to HIV-positive mothers (range of 55-75 percent) do not become HIV-infected, even when breastfed.

Figure 2: MTCT in 100 HIV+ mothers by timing of transmission



For more detailed information about various aspects of MTCT, see the reading list in Annex C.

1. HIV transmission during pregnancy

In most infected women, HIV does *not* cross the placenta from mother to fetus, and the placenta may actually shield the fetus from HIV (Anderson, 1997). This protection from the placenta may break down, however, if the mother has a viral, bacte-

rial, or parasitic placental infection during pregnancy, or if the mother has advanced immune deficiency associated with AIDS. It has also been generally accepted that a mother has a greater risk of transmitting HIV to her baby if she became infected during pregnancy because new infection causes a very high level of the virus to develop for a short period of time. However, one study from Thailand found that there was no increased risk of MTCT and no significant difference in viral load at delivery between HIV-infected women who seroconverted during pregnancy, and those who were HIV-positive when first tested (Roongpisuthipong et al., 2001).

2. HIV transmission during labor and delivery

Infants of HIV-infected mothers are at great risk of becoming infected with HIV during childbirth. During this single event, between 10 and 20 percent will become infected if no steps are taken to prevent transmission. Many infants who acquire HIV during labor and delivery do so by sucking, imbibing, or aspirating maternal blood or cervical secretions that contain HIV. Others can acquire HIV through the mixing of fetal and maternal blood as the placenta separates. The duration of membrane rupture (often performed deliberately to augment or induce labor); acute chorioamnionitis (resulting from untreated sexually transmitted diseases [STDs] or other infections); and invasive delivery techniques that increase the baby's contact with the mother's blood have been associated with higher risks of MTCT during labor and delivery (Anderson, 1997; WHO, 1999).

3. HIV transmission through breastfeeding

HIV is present in breast milk, although the viral concentrations in it are significantly lower than those found in blood. Between 10 and 20 percent of infants born to HIV-infected mothers become infected through sustained breastfeeding (18 months or longer). However, several recent studies suggest that the risk of HIV transmission during breastfeeding depends on several factors, including:

- **Infant age**
Evidence suggests that between 50 and 75 percent of all breastfeeding-related HIV transmission occurs in the first six months of life (WHO, 2001e; Nduati et al., 2000), although the risk of transmission may be lower when exclusive breastfeeding is practiced (see below). The risk of postnatal transmission declines in the second year of life (Coutsoudis, 2001; Miotti et al., 1999).
- **Pattern of breastfeeding**
Babies who are breastfed exclusively may have a lower risk of becoming infected than those who also consume other liquids, milks, or solid foods in the first months of life. This may be due to early immune stimulation; because early introduction of foods and/or pathogens causes gastrointestinal disturbances that increase gut permeability and provide an entry point for the virus, or because feeding patterns are associated with other risk factors such as mastitis that influence breast milk HIV concentrations (Coutsoudis et al., 1999; Coutsooudis et al., 2001b; Nicoll et al., 2000; Smith and Kuhn, 2000). Research is currently being carried out in several countries, including South Africa, Zambia, and Zimbabwe, to confirm these findings and to better understand the relationship between infant feeding patterns and HIV transmission.
- **Breastfeeding duration**
The risk of HIV transmission persists for as long as the infant is breastfed.
- **Breast health**
Mastitis, breast abscesses, cracked and bleeding nipples, and other indications of breast inflammation are associated with higher risks of transmission (John et al., 2001; Nicoll et al., 2000; Semba and Neville, 1999).
- **Maternal viral load and maternal immune status (Leroy et al., 2001)**
- **The mother becoming HIV-infected during the breastfeeding phase**
The risk of postnatal MTCT is believed to double (to about 30 percent) if the mother becomes infected with the virus while breastfeeding (Dunn et al., 1992).
- **Infant oral lesions**
Infants with oral thrush, particularly in the first six months, are at greater risk of becoming infected with HIV during breastfeeding (Embree et al., 2000).

Transmission also can occur in infants *after* birth through contact with infected blood, blood products, or inadequately sterilized medical equipment, but this is thought to be relatively rare. Efforts to improve the safety of the blood supply, to avoid unnecessary delivery-related blood transfusions, and to improve infection control practices probably have further reduced the incidence of non-MTCT transmission in infants.

B. Diagnostic challenges in infants and children

Diagnosis of HIV/AIDS in infants can be done by laboratory tests, where available, or by observing AIDS symptoms. HIV can be measured through an antibody test; however, infants born to HIV-infected mothers still carry their mother's antibodies in their blood into the second year of life, even if the infants themselves are not infected. For this reason, standard HIV antibody tests cannot reliably confirm HIV infection in infants until after the maternal antibodies have disappeared.⁸ Tests that *can* diagnose pediatric HIV infection accurately during the first year of life include HIV-PCR, CD4/CD8 counts, P24 antigen tests, and viral cultures. These have been used in research settings but are currently too expensive for routine use in resource-poor settings.

Recently, WHO updated its guidelines for diagnosing symptomatic HIV infection in children living in settings where laboratory testing is not available. These new diagnostic and management guidelines are being incorporated into protocols for the Integrated Management of Childhood Illness (IMCI) and should also be considered in countries where IMCI has not yet been introduced. According to the new guidelines (WHO, 2000a), children presenting any three of the following specific signs or conditions are suspected to have HIV infection:

- Two or more chest infections requiring antibiotics in the past two months
- One or more episodes of persistent diarrhea or two or more episodes of acute diarrhea in the past two months
- A parent with tuberculosis
- Oral candidiasis (thrush)
- Enlarged lymph nodes in two or more sites (cervical, inguinal, axillary)
- Growth faltering (weight curve flat or falling for two consecutive months)
- Weight-for-age below the third percentile (< -2 standard deviations from the median) using international growth reference standards.

IV. THE THREE-PRONGED APPROACH TO THE PREVENTION OF MTCT

A. Primary prevention of HIV/AIDS in women

Strengthening and scaling-up primary prevention of HIV/AIDS to keep men and women of reproductive age from becoming HIV-infected must be a priority strategy for preventing MTCT worldwide. Primary prevention efforts have shown success in stabilizing or reducing HIV infection rates in countries such as Cambodia, Senegal, Uganda, and Thailand, where they were introduced early in the epidemic and there was strong political commitment, generous funding, and broad coverage. Considerably more is known now about lessons learned and best practices related to achieving primary prevention than in the early years of the epidemic.

Primary prevention at the community level traditionally relies on three major components, and MTCT can become a part of each effort:

- **Promotion and provision of free, subsidized, and/or commercially marketed condoms.** Condoms are effective against HIV transmission when used correctly and consistently, but this is not always understood or accepted by people at risk. In most Asian countries, condoms are not always available at high-risk sites such as brothels; hence, both promotion and provision are

⁸ Some PMTCT programs, however, now recommend that the antibody test be administered to the infant as early as nine-12 months. In cases where a positive test result is found, the test is repeated later.

important. Programs to promote condom use for HIV prevention should emphasize their role in prevention of MTCT and prevention of HIV in sexually active adults. In Thailand, the fact that condoms had been promoted aggressively and effectively for many years for family planning may have made it easier to promote them for HIV/AIDS prevention through Thailand's "100 percent condom program."

- **Behavior change communication (BCC) efforts.** BCC aims to reduce behaviors that place individuals at risk of becoming HIV infected or spreading the virus to uninfected partners by providing accurate information about individual risks, modes of HIV transmission, and effective means to avoid transmission. It also seeks to motivate individuals to use this information consistently and appropriately. BCC programs need to include information about MTCT in their messages. These messages should include information about risks of MTCT during pregnancy, delivery, and through breastfeeding, and encouragement to see a VCT counselor or health provider for more information on how to prevent HIV/AIDS among infants and young children.
- **Prevention, diagnosis, and treatment of sexually transmitted disease (STDs).** STD prevention and treatment programs are important because the presence of untreated STDs is now known to increase the risk of transmitting and acquiring HIV. WHO estimates that improvement in the management of sexually transmitted infections (STIs) can reduce by about 40 percent the incidence of HIV infection in the general population (WHO, 2001d). Not only are many women unaware of the STI/HIV relationship, but they may also consider STDs "normal" health problems.

Men and women who are at risk or have contracted an STD are sexually active and, therefore, are appropriate target audiences for information on MTCT risks and prevention. STD services should include information on the risk of MTCT, modes of transmission, and, as with BCC, encouragement to see a VCT counselor or health provider for more information on how to prevent HIV/AIDS in infants and young children.

Specific MTCT education, which is introduced as part of primary prevention of HIV/AIDS in adults, may even serve as a motivating force for avoidance of unsafe sexual behavior. Condom social marketing, family planning, BCC, and STD prevention and treatment programs can be extremely effective in explaining MTCT and the risk that unprotected sex brings to babies.

Increasing understanding about the impact of HIV on pregnant and breastfeeding women, and about options for preventing MTCT, can contribute to a more open dialogue between men and women about safe sex and sexual behavior. MTCT must become a part of life-skills training for youth so they learn early how to protect their future families from infection. Since young women have a particularly high risk of contracting HIV in many countries, there is an ever-increasing need to influence attitudes and norms surrounding MTCT, reduce the stigma associated with HIV, and increase knowledge and skills among both boys and girls about how the disease is spread from parents to children. Finally, including MTCT prevention education at the community level is essential to foster an environment supportive of women who face difficult decisions related to MTCT and its prevention.

MTCT messages should be integrated into all HIV/AIDS education, including life-skills curricula, adolescent outreach programs, programs to reach men, and school- and faith-based AIDS education programs.

BOX 1: ACTIVITIES FOR PRIMARY PREVENTION

- Support community-based VCT services and counseling and testing for premarital couples.
- Develop social marketing programs for condoms and provide free, subsidized, and/or commercially marketed condoms.
- Promote condom quality assurance.
- Provide training and technical assistance in BCC best practices.
- Use BCC for primary prevention, including messages and materials development that target pregnant women and couples.
- Identify and promote effective sexual negotiation skills.
- Support printing, radio, or TV program development and airtime.
- Secure funding for surveys of community knowledge, attitudes, and practices related to HIV/AIDS.
- Implement educational and outreach efforts aimed at community members, especially related to MTCT.
- Provide training in STD prevention, diagnosis, and treatment and link HIV/AIDS prevention to the social marketing of STD kits, where available.
- Provide STD treatment drugs.
- Develop STD syndromic management guidelines.
- Conduct activities to promote political will and support by community leaders.

B. Preventing unwanted pregnancies in HIV-infected women

One of the most effective means of preventing MTCT is to prevent unwanted births in HIV-infected women of reproductive age. This requires provision of VCT services and voluntary, safe, and effective contraception, sterilization, or pregnancy termination.

Providing safe and effective contraception and high-quality reproductive health counseling can help a woman practice safer sex, determine her future childbearing patterns on a more responsible and informed basis, and potentially avoid HIV-infected births. Women who learn that they are HIV-positive may have a strong desire to avoid bearing additional children who may be born HIV-infected and become orphaned at an early age.

Availability of effective interventions to prevent MTCT may affect the choices presented to an HIV-positive mother during counseling as well as her future reproductive decisions. VCT services provide an excellent opportunity to offer family planning counseling and referral while informing HIV-positive women and couples about the MTCT risks inherent in current and future pregnancies.

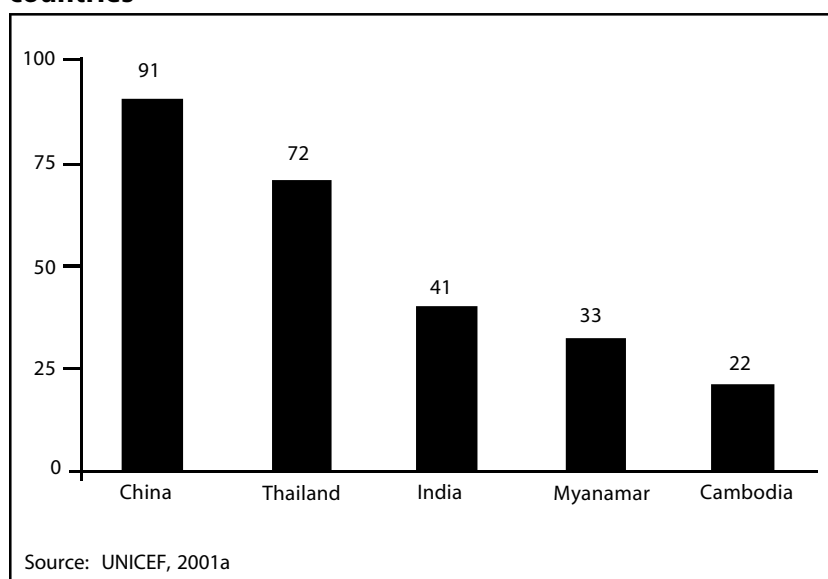
Contraceptive Prevalence in Asia

The availability and use of modern contraception varies significantly across Asia, including among those countries most seriously affected by HIV. Contraceptive prevalence rates⁹ (CPR) (UNICEF, 2001a) are high in Thailand and China, a result of successful long-standing family planning programs. In India, although family planning has also long been a government priority, the CPR is relatively low. In Myanmar, modern contraception has only been made available to women by the government

⁹ The contraceptive prevalence rate is defined here as the percentage of married women aged 15-49 currently using contraception.

relatively recently, and the CPR reflects that lack of service. Although family planning has been encouraged in Cambodia, the family planning program has been weak, and the CPR rate is also low. CPR rates for these five countries are found in Figure 3. The average CPR in South Asia is 40 percent, and in East Asia and the Pacific, 81 percent. Contraceptive prevalence rates for other Asian countries are found in Annex D.

Figure 3: Percent of married women aged 15-49 years currently using contraception in high-HIV-prevalence Asian countries



The increased infant and child mortality caused by HIV/AIDS has not reduced the unmet need for family planning services, which remains high in the countries discussed above, for both spacing and limiting births. Instead, rapid and extensive spread of HIV and the problem of MTCT will make the provision of family planning counseling and voluntary, safe, and effective methods of contraception even *more* critical in Asia.

The Role of Condoms

Condoms have long been promoted to protect against STDs (including HIV), but they are not the most effective contraceptive for preventing unwanted pregnancy. Modern, nonbarrier contraceptives are often recommended for birth spacing and family size limitation, although they do not protect against STDs. The use of both condoms to prevent STDs (including HIV) *and* a more effective, nonbarrier method to prevent pregnancy is referred to as “the dual protection approach” and is increasingly advocated in settings where STDs (including HIV) are prevalent.

Special Contraceptive Needs of Mothers Who Do Not Breastfeed

HIV-infected mothers who opt not to breastfeed miss the important birth-spacing effect of lactational amenorrhea. These women have their own special needs for contraception to space or limit future births. Women also need to understand that, since the risk of MTCT increases as the mother’s own infection progresses, the risk of MTCT may grow with subsequent pregnancies (UNAIDS, 1999).

Contraception and HIV in Asia

Documented experience with contraception in HIV-infected women is limited in Asia. In Thailand, sterilization has historically been an important part of the family planning program, and sterilization

has also been offered to pregnant women found to be HIV-infected. For HIV-infected Thai women not wishing sterilization (but desiring contraception), the Norplant implant contraceptive has been found to be safe, efficacious, and well tolerated in the immediate postpartum period among asymptomatic HIV-positive women (Taneepanichskul and Tanprasertkul, 2001).

Safe and Unsafe Abortion in Asia

In both Cambodia and Myanmar, reliance on unsafe abortion as a response to the lack of modern contraceptives has been a major cause of mortality in women. In India, although abortion is legal, it is frequently performed under unsafe or undesirable conditions (Bedimo et al., 1998). A survey of 450 sex workers operating in Calcutta revealed that 67 percent had a history of pregnancy, and 46 percent had resorted to abortion (Chakraborty et al., 1994).

Demand for induced abortion could possibly increase with the spread of VCT services, as more and more women learn they are HIV-infected. The implications of severe infections resulting from unsafe surgical abortions for HIV-positive women are serious, as is the risk of HIV infection for the providers of the unsafe abortions. In many Asian countries, medical abortion¹⁰ (also referred to as the “abortion pill”) is proving to be a safe and acceptable alternative to surgical abortion and may be an appropriate option for HIV-infected women. Medical abortion has already proven safe, feasible, and effective in India (Coyaji, 2000), Vietnam (Elul et al., 2001), and China (Wu, 2000) and is currently being explored in other developing countries (Duncan, 1999).

The high incidence of unsafe induced surgical abortion in some countries in Asia is another strong rationale for increasing efforts to provide birth spacing linked with HIV counseling efforts. It is also important to increase efforts to treat the medical consequences of unsafe abortion.

BOX 2: ACTIVITIES FOR PREVENTING UNWANTED PREGNANCIES

- Train family planning workers in HIV/AIDS (and MTCT) and contraceptive issues related to HIV infection.
- Establish referral links between VCT and family planning counseling services.
- Provide additional contraceptives, if necessary.
- Promote dual protection (of unwanted pregnancies and STIs).
- Conduct formative research on reproductive choice and decision making in relation to HIV infection.
- Strengthen family planning counseling and service provision in antenatal and postpartum services.
- Promote voluntary family planning as an effective MTCT intervention for HIV-infected women.
- Improve obstetric practices through Safe Motherhood programs.

¹⁰ Medical abortion uses the drugs mifepristone (RU-486) or mifepristone-misoprostol.

C. Core interventions to prevent MTCT by HIV-positive mothers

The remaining focus of this paper is on five *core* MTCT interventions for preventing transmission in HIV-infected pregnant women, and how they can be introduced in Asia within broader HIV/AIDS prevention, child survival, reproductive health, family planning, and food security programs. *Core* MTCT interventions are those that *directly* prevent MTCT during pregnancy, labor, and delivery and during the postpartum period in women who are already HIV-infected. Some of these interventions may also benefit uninfected women and women who do not know their HIV status.

Core MTCT prevention interventions described in this paper include:

- Comprehensive MCH (antenatal, postnatal, and child health) services
- Voluntary, confidential counseling and testing (VCT)
- Antiretroviral (ARV) prophylaxis
- Counseling and support for safe infant feeding
- Optimal obstetrical practices.

All of the core MTCT prevention interventions rely on the health system and communities to be able to implement them successfully; hence, strengthening the quality and comprehensiveness of *MCH services* is critical. The interventions are offered at the prenatal stage, during labor and delivery, and/or in the postpartum period. *VCT* is essential for identifying HIV-infected mothers who could benefit from ARV prophylaxis, HIV-negative mothers who can take steps to prevent infection, and mothers in need of links to HIV care and support. Reducing postnatal transmission requires the capacity to inform women and families fully about the possible risks and benefits of various *infant feeding* options and to counsel and support them in their feeding decisions. Improving *obstetrical practices* should be both feasible and affordable, but the overall impact of these improvements on MTCT prevention in resource-poor settings has not been quantified. *Antiretroviral (ARV)* prophylaxis is the most effective intervention for reducing MTCT. To date, availability of ARV prophylaxis has been limited in resource-poor parts of Asia, due in part to cost and weak health infrastructures, but intensified focus and attention to this intervention and reduced costs in recent months should begin to expand its coverage.

These core interventions vary in their cost, potential impact, and ease of delivery. While none of these individual core interventions is 100 percent effective in preventing MTCT, when introduced in combination, their impact can be significant. They are interventions known *today* to be the most effective for identifying HIV-infected women and for reducing the risk of HIV transmission during each of these periods. As research continues, it is likely that new interventions will be identified and validated for their technical merits. At the same time that these interventions are evaluated for effectiveness, operational research is needed to measure and improve their coverage, cost, feasibility, acceptability, quality, and integration into broader HIV/AIDS and other health programs.

Activities that are supportive of, or a prerequisite for, introduction of these core interventions are listed in the activity boxes below. Many existing programs offer *entry points* for these activities, and some activities may be already underway. Some of the interventions are relatively simple and inexpensive and can be introduced relatively easily, even in resource-poor Asian settings. Others, such as ARV prophylaxis, may be new and will require policies and procedures as well as training to administer them. Some interventions are “test-dependent,” requiring an HIV test to identify women who are HIV-infected and who therefore are candidates for that intervention. Others can be applied to all women attending antenatal clinics, regardless of their actual HIV status.

Each setting planning to introduce a package of PMTCT interventions will need to assess what package is appropriate for that setting. There is considerable variation in resource availability and comprehensiveness among existing MTCT prevention interventions in the countries highlighted in this paper. Whereas many African countries seriously-affected by HIV/AIDS are now moving from pilot phase MTCT prevention to attempting national coverage, many Asian countries do not yet have viable pilot projects. Some of the elements of pilot tests and clinical trials of ARV drugs undertaken in Africa will be applicable to Asia and will not need to be repeated. Pilot projects may still be necessary for some Asian settings, however, to thoroughly consider and address specific logistic issues, cultural beliefs, and acceptability.

Current knowledge about the impact, safety, feasibility, and other related benefits of these five core MTCT prevention interventions are summarized in Table 3.

TABLE 3: Characteristics of core MTCT prevention interventions

INTERVENTION	PROBABLE IMPACT ON MTCT PREVENTION	RELATED RISKS	PROBABLE FEASIBILITY	OTHER RELATED BENEFITS
Improving comprehensive MCH services	Essential for delivering effective MTCT prevention interventions	No risks, assuming services are delivered appropriately	Feasibility depends on how extensive the necessary improvements are	Significant reduction of maternal and child morbidity and mortality
Voluntary counseling and testing (VCT)	High if combined with all other interventions	Consequences of possible violations of confidentiality; psychological stress and stigma or violence against HIV+ women	Relatively high cost (for training, staffing, supervision, lab support, etc.) diminishes feasibility	Identifies women for MTCT prophylaxis and HIV care; facilitates planning for future; promotes primary prevention for HIV-negatives
Counseling and support for safe infant feeding	Not yet precisely quantified, but theoretically high (depends on the quality of the counseling, and on feeding decisions and practices)	If infants are breastfed, there is a risk of HIV transmission. If infants are not breastfed, there are risks associated with unsafe preparation and use of replacement feeds/infant formula, including increased malnutrition, morbidity, and mortality. A "spillover" effect is another potential risk of introducing replacement/formula feeding.	Safer infant feeding requires health worker training, community support, contact with mothers during the antenatal and postnatal period, and access to care and support should problems arise. In addition, to practice replacement feeding safely, sustained access to breast milk substitutes, clean water, fuel for cooking, and time and special skills are required. Stigma associated with not breastfeeding may also limit the feasibility of complete avoidance of breastfeeding.	Improved infant health and survival if implemented properly
Optimal obstetrical Practices	Not yet quantified precisely, but theoretically high	Safety is high; no risks (except potentially from C-section, if provided)	Feasible if training and supervision of health workers and birth attendants, sterile equipment, and improved guidelines are provided	Benefits both HIV-positive and HIV-negative mothers and infants; prevents occupational HIV transmission to birth attendants
ARV prophylaxis	High	Results of clinical trials to date indicate safety is high and risks are few, if any	VCT and comprehensive MCH services are essential requirements	None known

1. Comprehensive MCH services

PMTCT is increasingly considered to be part of the wider management of maternal and infant health during prenatal, delivery, and postnatal care (Castetbon et al., 2000). For pregnant women to *optimally* use interventions to prevent MTCT, they must be identified as being HIV-positive and have access to good-quality health services during the antenatal period, during labor and delivery, and after the birth. A full antenatal service package should include VCT; maternal tetanus toxoid immunization; STD screening and treatment; iron and folate supplementation; presumptive intermittent treatment for malaria prevention¹¹; tuberculosis treatment when appropriate; basic obstetric care; information on HIV prevention, infant feeding, and family planning (Dabis et al., 2000b); and nutritional and dietary counseling. Recognition of danger signs and planning for transport if obstetrical emergencies arise are also recommended.

Benefits of Improved MCH Services

Low utilization of ANC and other MCH services is a major problem in many resource-poor Asian countries. Advocacy for improved MCH services and use at all levels (community to national) is critical for PMTCT and has direct and indirect benefits for *all* mothers. For example:

- Reducing the incidence and severity of malaria, tuberculosis, reproductive tract, and other infections will improve an HIV-infected woman's chances of avoiding or delaying conditions that will compromise her health and survival.
- Improving antenatal care (ANC) will improve birth outcomes, such as stillbirths, low birth weight, preterm births, and infant mortality, regardless of the HIV status of the mother (Liljestrand, 1999).
- Malnutrition and HIV infection are inextricably linked. Improving HIV-infected mothers' nutritional status may help to slow the progression of HIV disease and prolong survival (Piwoz and Preble, 2000; Fawzi and Hunter, 1998; Semba, 1997).

Using MCH Services for HIV/AIDS Prevention Education

In addition to providing service delivery, MCH clinics are excellent entry points for delivering HIV/AIDS prevention education. Several studies from Asia emphasize the limited understanding pregnant women have about HIV and in particular, about MTCT. In India, for example, three studies reveal serious misconceptions among women about the transmission and prevention of HIV, as well as the fact that monogamous, married women may be at risk of HIV through their husband's extra-marital sexual behavior (Singh et al., 1997; Kunte et al., 1999; and Newmann et al., 2000).

Even in Thailand, where HIV prevention education has been aggressive and long-standing, studies show serious gaps in understanding among pregnant women:

- A study of 527 pregnant women visiting a Thai hospital for prenatal checkups found that 80 percent did not have sufficient knowledge of the possibility of MTCT (Hyodo et al., 2000).

¹¹ A number of studies have shown that HIV infection impairs malaria immunity in pregnant women. Placental malaria infection may increase the risk of MTCT, either indirectly through the effect of malaria infection on HIV viral load (Hoffman et al., 1999) or because of disruptions in the placental barrier (Rogerson and Beeson, 1999). However, evidence to date does not show an independent, causal relationship between placental malaria infection and increased HIV transmission from mothers to infants (Chandramohan and Greenwood, 1998).

- In northern Thailand, women were at risk of HIV through their husband's sexual behavior. Seventy-six percent of HIV-infected women interviewed reported no casual sex partners, so they had likely acquired the infection from their husbands. Nearly half of these women perceived themselves at no or low risk for HIV infection (Xu et al., 2000).

For pregnant women who do not know their HIV status, and for those who know they are HIV-negative, MCH services can also stress the importance of using condoms and avoiding unsafe sexual behavior during pregnancy to prevent HIV (and other STD) infection. By taking these measures, a woman avoids the high levels of the HIV virus that emerge in the acute phase immediately postinfection and that may be particularly risky for MTCT during pregnancy and breastfeeding.

Involvement of Men

Finally, since MCH clinics typically do not reach men, HIV/AIDS prevention outreach to men and communities is also extremely important so that MTCT prevention is not the burden of women alone.

In India, the government recognized that efforts to strengthen ANC services were not sufficient in isolation and that enhancing their acceptance in the community was critical. It was also noted that male involvement in MCH services was low in public sector (as opposed to private sector) clinics—husbands either were not allowed or chose not to accompany their wives for ANC services. India's PMTCT policy now mandates enhancing male involvement in ANC care and providing opportunities to implement various reproductive health-related interventions in a couples-oriented setting (NACO, n.d. [a]).

Health Workers' Attitudes

Health workers' attitudes toward and treatment of women with HIV are also important. In India, one study showed that village health nurses in Namakkal District (in South India) were not willing to conduct a vaginal delivery on HIV-infected women, because of fear of personal risk of HIV infection (Parameswari et al., 2001). In Thailand, as recently as 1997, a study of physicians' attitudes indicated that a significant proportion described themselves as unwilling to perform pelvic exams (19 percent), vaginal deliveries (31 percent), or cesarean deliveries (39 percent) on women who were known to be HIV-infected (Stringer et al., 1999). More work is needed to educate health workers about HIV and MTCT for them to provide more sensitive care to their infected patients.

Nutrition and HIV/AIDS

Finally, the specific role of nutrition services as part of MCH care is gaining increasing attention in relation to MTCT¹². Studies from Africa have indicated a possible positive role for multivitamin supplementation for improving the pregnancy outcomes of HIV-infected women (Fawzi et al., 1998). Furthermore, direct nutrition care and support, including food supplements, may help to prevent weight loss, maintain muscle mass, and prolong the period of relative health in infected but asymptomatic, HIV-infected adults (Piwoz and Preble, 2000).

The role of vitamin A supplementation has been studied extensively in relation to MTCT because of its association with HIV levels in plasma, breast milk, and genital secretions (Nduati et al., 1995; Mostad et al., 1997; John et al., 1997). To date, no studies have shown that vitamin A supplements can reduce MTCT during pregnancy and childbirth, and continuous supplementation during

¹² For example, Mahidol University in Thailand currently recommends that in cases of advanced-stage maternal HIV infection, and in developing areas where malnutrition prevails, an adequate supply of essential micronutrients be provided to help reduce HIV-1 perinatal transmission (Phuapradit, 1999).

breastfeeding may increase the risk of HIV transmission (Fawzi et al., 2001). The impact of one high-dose vitamin A supplement delivered within 96 hours of delivery, a current WHO recommendation for all women living in areas where infectious diseases are prevalent (WHO, 1997), on HIV transmission during breastfeeding is still being studied.

Although the benefit of vitamin A supplementation for PMTCT has not been demonstrated, several studies suggest that such supplementation does reduce morbidity in HIV-infected children (Coutsoudis et al., 1995; Fawzi et al., 1999; Villamor et al., 2002). In addition, a recent study from South Africa indicated that vitamin A supplementation during pregnancy may prevent the deterioration of gut integrity in infants who become infected (Filteau et al., 2001). Thus, vitamin A supplements for all infants and children should be provided as part of the package of MCH care.

BOX 3: ACTIVITIES FOR COMPREHENSIVE MCH SERVICES

- Support health management systems and systematic assessments of the quality and reach of MCH services.
- Provide specific training to health workers in MTCT-related areas such as safe delivery techniques, essential antenatal care, appropriate contraception for HIV-infected women, choice and support of infant feeding method (including techniques for safer breastfeeding), and care for mothers and children.
- Foster links between family planning counseling and HIV/AIDS education, counseling, and testing.
- Support HIV/AIDS education in MCH clinics.
- Provide necessary MCH-related pharmaceuticals, supplies, equipment, and nutritional supplements.
- Promote functional drug logistics management.
- Invest in new methods of short-term health worker training that emphasize knowledge, attitudes and competency acquisition.
- Involve partner and family in antenatal care.

2. Voluntary counseling and testing

Benefits of VCT

Studies from Africa have shown that voluntary (and confidential) counseling and testing is a cost-effective intervention for reducing HIV-related risk behavior, particularly when it serves at-risk couples (Voluntary HIV-1 Counseling and Testing Efficacy Study Group, 2000; Sweat et al., 2000). Experience from Thailand in the early years of the epidemic confirms the value of VCT in contributing to the reduction of HIV transmission there as well (Muller et al., 1995). In regions seriously affected by HIV, VCT is increasingly being viewed as an integral part of access to comprehensive, essential, quality health care (Coovadia, 2000).

For women who are identified before or during pregnancy as being HIV-positive, test-related counseling can help them plan for their future and the future of their families. Such counseling can also help the HIV-positive woman to take special steps to maintain her health, not infect her sexual partner, be linked with support groups and services, and make informed choices about her sexual behavior and future childbearing (UNAIDS, 1999). For HIV-negative women, counseling can reinforce

the importance of safe sexual behavior and provide other information and support to help them to remain uninfected.

VCT services are also an essential prerequisite to identify women (and families) who may benefit from certain MTCT prevention interventions. In the absence of VCT services, most women have no definitive way to know their HIV status until they fall ill with identifiable AIDS symptoms, or until they give birth to a baby who is diagnosed with HIV/AIDS. As a result, most MTCT interventions are closed to them. ARV prophylaxis for the prevention of MTCT, for example, generally is given only to women with confirmed HIV infection. Infant feeding counseling is most effective when it can take into account the actual HIV status of the mother.

Although it may be cost-effective, VCT is nevertheless one of the most expensive PMTCT interventions: it requires hiring, training, and supervising counselors; adequate private physical facilities for counseling; and laboratory support (laboratory space, trained laboratory technicians, and HIV test kits and reagents).

Demand for VCT

Demand for and uptake of VCT services in PMTCT programs appears to vary widely within and between countries. In many places in Africa, demand for VCT is low when services are first introduced. In PMTCT programs, it is not unusual for fewer than half of all eligible women to accept pretest counseling, go for testing, and return for their HIV test results, even when ARV drugs are available for PMTCT (Coovadia, 2000; Castetbon et al., 2000). This situation is not limited to the developing world. Even in the United States, of the 2.5 million people who are tested at public sites annually, 30 percent never return to learn their status (CDC, 2001d).

Low demand and follow-up for VCT have been attributed to a variety of factors:

- low awareness of the availability of VCT services
- low awareness of the potential benefits of VCT
- lack of confidence in the quality of VCT services (including confidentiality)
- stigma associated with a positive HIV test result
- length of time required to wait for the test result
- insensitive treatment by health providers
- insufficient links to care and support for those found to be HIV-positive.

Data on the demand for VCT in Asia are limited. Acceptance rates among antenatal women in the well-established Region 7 PMTCT pilot program in Thailand, and the Calmette Hospital PMTCT pilot project in Phnom Penh, Cambodia, were 93 percent (CDC, 2001b) and 85 percent (Glaziou, 2001), respectively. A newer PMTCT site in Myanmar reported acceptance of only about 30 percent (UNICEF, 2001b).

Entry Points for VCT

VCT services can be offered through stand-alone, community-based testing centers; thorough private practitioners; or at health centers as part of MCH, family planning, and youth-friendly health programs. Some significant advantages to women of offering VCT services in MCH or antenatal settings (in addition to the prevention of MTCT) include:

- Making VCT a *routine* MCH service (offered to every MCH client) can help reduce the stigma associated with both VCT and HIV infection.
- VCT offered at MCH clinics may be more acceptable to women than walk-in centers that serve both men and women, and MCH clinics can cater better to women's reproductive health-related questions about HIV/AIDS.
- VCT services based in antenatal clinics can reach a high percentage of pregnant women, especially when offered as a routine service.
- Offering VCT within the MCH center will help to integrate HIV/AIDS programs with other forms of health care, such as treatment of STDs and other infections, nutrition support, and family planning. When women come to antenatal clinics for repeat visits, they can be given answers to different HIV-related questions at various stages of their pregnancy.

On the other hand, anecdotal reports suggest that there are several disadvantages to MCH-based programs, including limited access for male partner testing (unless special efforts are made by the program), fears about loss of confidentiality, and stigma associated within the family if women are seen as the ones who "bring the disease to the home" through testing.

Opt In or Opt Out Testing Services

VCT sites that *are* located within antenatal services need to determine how women will be invited for testing services. Because some programs in Africa were experiencing very low uptake of testing, they have developed a model of "opt-out testing." Whereas traditional VCT services require women to choose and consent to be tested ("opt-in"), opt-out testing means that antenatal women are offered VCT routinely and they are tested unless they specifically decline or do not consent. In addition, in very-high-HIV-prevalence settings, such as in Botswana—where 45 percent or more of the women coming for antenatal care are HIV-positive—governments are also offering short-course ARV prophylaxis for women who are offered testing but decline. The impact of this strategy on VCT and other PMTCT interventions is unknown and requires research and documentation in the future.

VCT at the Time of Delivery

While it is best if women receive VCT through MCH services *during* the antenatal period, some facilities have recognized that many women appear for delivery without having received antenatal care from that facility, or at all. For these cases, some MTCT prevention projects have been willing to provide testing at the time of delivery, to enable women who are HIV-infected to receive ARV prophylaxis. Such sites include, for example, the Calmette Hospital MTCT prevention project in Phnom Penh, Cambodia (Agence Nationale de Recherches sur le SIDA, 2000); the Rajavithi Hospital in Bangkok, Thailand (Bennetts et al., 2000); a large public hospital in Pune, India (Shrotri et al., 2001); and a rural district in Tamil Nadu, India (Samuel et al., 2001). In the last two settings, where many women present for the first time while in labor, studies concluded that a rapid test in the delivery room can increase VCT coverage and uptake significantly. This approach is not without its critics, who maintain that women are not capable of giving truly informed consent at this time and are not fully receptive to counseling.

The Importance of Reaching Men

Regardless of the VCT setting, it is important that VCT services reach men and women, since a woman's partner's HIV status is a critical part of the family's decision-making framework. Regardless of the male partner's HIV status, involving him in the HIV test-related counseling can help ensure that he is supportive of his partner's dilemmas and choices related to HIV, infant feeding, and family planning.

Lessons Learned from Asia and Elsewhere

- Anecdotal evidence suggests that HIV testing services are increasing in the *private* sector in Asia, with particular focus on premarital HIV testing. The quality of the testing, whether counseling is offered, and the quality of the counseling are largely unknown. However, if these private premarital testing services *are* of high quality, they could be very effective in promoting and sustaining safe sexual behavior among young people as well as preventing MTCT.
- Regardless of which HIV test, or combination of tests, is used, quality control and conformity with national standards and guidelines are essential. Both false positive and false negative test results can have serious consequences for those tested, their partners, and their families.
- Systems must be in place to ensure the confidentiality of VCT services, and the community's confidence in this confidentiality must be developed. In some cases, the physical counseling environment must be improved through renovation of health facilities. In addition, separate counseling rooms may be needed to ensure confidentiality.
- Health workers must be properly trained in MTCT and feel comfortable with the MTCT program to guide women to VCT services.
- In all settings where VCT is offered, programs should target their prevention messages to women and their partners who are tested and found to be HIV-negative as well as those found to be HIV-positive. Special support will be needed for women who test positive, to address disclosure to partners and families, learning to live positively with HIV, and planning for the future.

To guide program managers and service providers in the establishment of high-quality VCT services in antenatal care, WHO has produced a comprehensive guide (WHO, 2000c).

BOX 4: ACTIVITIES FOR VCT PROGRAMS

- Provide in-service training of health workers in MTCT, principles of integrated MTCT risk reduction, VCT, and management of women found to be HIV-positive and HIV-negative.
- Train peer and professional HIV counselors in MTCT prevention and improved VCT techniques.
- Review preservice training curricula to incorporate MTCT and VCT issues.
- Provide space for confidential counseling.
- Ensure adequate supervision of VCT services using quality assurance methods.
- Provide HIV rapid test kits, gloves, antiseptics, syringes, needles, vacutainers, lancets, and other lab consumables.
- Train laboratory technicians and fund laboratory quality assurance.
- Promote VCT awareness, education, and support in the community.
- Conduct formative research on acceptability, demand creation, and consequences of VCT.
- Make family planning counseling and referral for services available at VCT centers.
- Link VCT services to other support services in the community through referral partnerships.

3. Antiretroviral prophylaxis

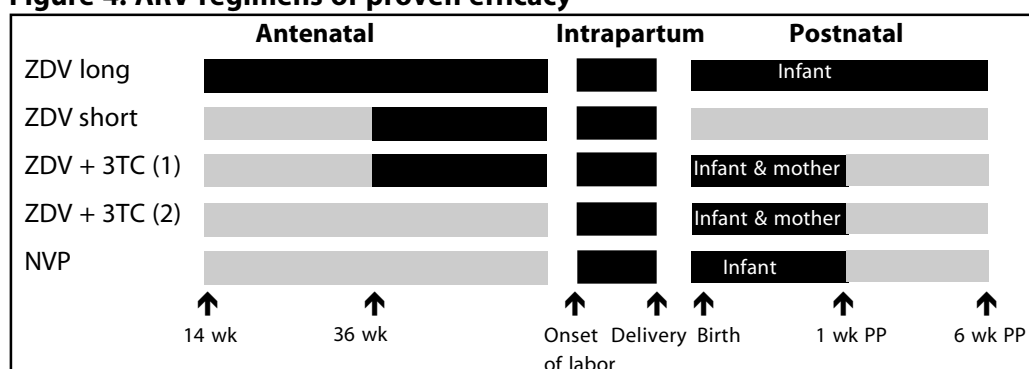
It is important to differentiate between antiretroviral drug therapy used to treat HIV-infected adults and children and ARV drugs used to prevent MTCT. Although dramatic price reductions have been seen in the last year, ARV drugs used for long-term treatment (sometimes referred to, when used in combination, as highly active antiretroviral therapy, or HAART) are still prohibitively expensive and not widely available for most people living with HIV/AIDS in resource-poor settings.

ARV drugs used to prevent MTCT, on the other hand, are much simpler to administer and less costly because they are given in a small dose for a short duration. These drugs work primarily by reducing the maternal HIV-1 plasma viral load—one of the major predictors of vertical transmission. Several simplified ARV prophylaxis protocols have been proven efficacious and safe in developing countries among breastfeeding and nonbreastfeeding women (WHO, 2001e).

Different Regimens of ARV

Figure 4 illustrates various combinations and regimens of the three major ARV drugs that have been studied extensively and approved for use in PMTCT expansion programs (WHO, 2001e). These include a long and short regimen using zidovudine (ZDV); two regimens using ZDV plus 3TC; and one regimen using nevirapine (NVP). Newer regimens combining ZDV and NVP are being tested.

The first studies of the antiretroviral drug ZDV, also known as azidothymidine (AZT), to prevent MTCT were undertaken in the United States (Connor et al., 1994) and Thailand (Shaffer et al., 1999). These studies demonstrated impressive efficacy of the ZDV “long” regimen (see Figure 5) for PMTCT, but the protocols for delivering the drugs were too complex and expensive for widespread developing-country replication since they depend on early identification of pregnancy, good and early antenatal care, intravenous administration of the drug during labor, and provision of infant formula so that breastfeeding can be avoided completely.

Figure 4: ARV regimens of proven efficacy

Complete avoidance of breastfeeding is challenging in many resource-poor settings for cultural and economic reasons. Safe use of breast milk substitutes is difficult and risky for child survival in areas where safe water and sanitation are unavailable and an adequate supply of replacement foods cannot be sustained. The Thailand study results were followed quickly with results from five other studies in Africa, where breastfeeding is typically practiced. In Côte d'Ivoire and Burkina Faso (Wiktor et al., 1999; Dabis et al., 1999), two variations of a simpler-course ZDV regime were tested. In Tanzania, Uganda, and South Africa, a simpler course of ZDV was combined with the drug lamivudine (3TC) (Saba, 1999). In Uganda, a single dose of NVP was given to each mother in labor and to the infant during the first week of life. In the SAINT study in South Africa, the efficacy of a short course of NVP was compared with short-course ZDV and 3TC (Moodley, 2000). All of the studies were carried out among breastfeeding women, but no distinction regarding breastfeeding patterns was made in these studies (Piwoz, 2000).

The extent to which breastfeeding diminishes the overall efficacy of these ARV regimens is still under review. Available studies suggest that, while delivery-related and early postnatal-related MTCT can be reduced by about 50 percent (from about 20 percent to about 10 percent), another 8 to 10 percent of HIV-infected women pass the virus to their infants through continued breastfeeding (to 18 months or longer). This is in contrast to the 10 to 20 percent of women transmitting the virus during breastfeeding in settings where no ARV or other MTCT prevention interventions are used (see Section III.A.3). It is not yet clear whether the observed reduction in breastfeeding transmission is the result of lower early postnatal transmission, modified breastfeeding practices, or a combination of both.

The choice of an ARV regimen for use in a given setting must take into account feasibility, efficacy, and cost. Specific considerations include the proportion of women attending antenatal care; the timing and frequency of their antenatal visits; the availability and acceptability of antenatal VCT; the ability of ANC services to deliver the drugs to women; and the acceptability of ARV prophylaxis among infected women and families (WHO, 2001e).

Issues Related to NVP

While the results of the ZDV regimens are impressive, even among breastfeeding women, NVP has significant advantages in MTCT prevention programs. NVP is considerably less expensive than other drugs; it is easier to administer; and, so far, it has been shown to be more efficacious in breastfeeding populations (Guay et al., 1999; Bardsley-Elliott and Perry, 2000). The drug's overall safety profile has been impressive (Wood et al., 2000).

Although NVP usually is given only to women who have tested HIV-positive, as mentioned earlier, in some very high seroprevalence areas in sub-Saharan Africa, providing NVP to women of unknown serostatus is being considered. One study, using a crossover design, has been carried out in Lusaka, Zambia. This study found that HIV testing and NVP uptake varied depending on the quality of health services. In one clinic characterized as well organized, the uptake of NVP for PMTCT was similar when it was offered with and without testing first (about 70 percent). In another clinic characterized as poorly organized, NVP uptake was significantly lower when testing was required (about 48 percent) (Sinkhala et al., 2001).

Some advocate providing NVP to women of unknown HIV status because it can increase the coverage of PMTCT programs and it allows women more of a choice in MTCT prevention. Providing NVP with counseling but no available testing services has been suggested (Marseilles et al., 1999; Stringer et al., 2000), but this is still a controversial recommendation. In December 2001, WHO held a technical consultation to review issues around the administration of NVP to women of unknown HIV status. The final statement from this consultation is expected in 2002.

Regardless of whether women know their HIV status, NVP is administered more easily to pregnant women than other ARV regimens. NVP can be provided easily in several different ways:

- It can be administered by a health worker at the onset of labor at a health facility.
- It can be self-administered by mothers if they have been given the drug during an antenatal visit.
- It can be administered by traditional birth attendants (TBAs) who have been given NVP to use when they deliver women at home.

In July 2000, Boehringer Ingelheim, the manufacturer of NVP, announced its intention to donate this drug without charge for five years to any country that wished to use it for PMTCT, provided NVP is licensed for use in the country, and the MTCT program meets certain standards of quality and comprehensiveness. It is important to emphasize, however, that the cost of NVP is only one part of the total cost of MTCT prevention. Other program components, including VCT, safe infant feeding, and monitoring and evaluation, are also expensive and must be provided to complement the drug.

The Issues of Drug Failure and Resistance

ARV prophylaxis can reduce PMTCT by about 50 percent when administered in late pregnancy and around the time of delivery. Risk factors for drug failure, now under study, include incomplete regimens, late administration (especially in the case of NVP), and low CD4 cell counts/ immune deficiency at the time of administration (Leroy et al., 2001; Mirochnick et al., 2001).

There are also concerns that transient drug resistance can contribute to the failure of ARV prophylaxis (Brenner and Wainberg, 2000; Eshleman 2001a; Eshleman 2001b; Kijak et al., 2001). The issue of resistance raises these concerns: a) the possibility that resistant virus can be transmitted during sexual intercourse and breastfeeding; b) the possibility that ARV prophylaxis in subsequent pregnancies will be less effective; and c) the possibility that the ARV drugs used for prophylaxis will be less efficacious when used as part of a treatment protocol (WHO, 2000b).

Concern has also been expressed that *universal* distribution of NVP (versus targeted distribution) could promote resistance. This argument is not valid, however, because provision of NVP to mothers who are *not* HIV-infected will not cause resistance to develop (Galbraith and Bennish, 2001).

Asian Experience with ARV Use for MTCT Prevention

Despite the proven efficacy of ARV drugs to prevent MTCT, many Asian nations have been slow to make them available. Reasons for this include expense; difficulties in providing the requisite antenatal HIV screening, counseling, and distribution; and fears of toxicity and resistance (Salojee and Violari, 2001).

Most of the Asian experience with the use of ARVs to prevent MTCT comes from Thailand, where much of the original research on various regimens of AZT was conducted. Thailand's research has demonstrated the feasibility and efficacy of AZT for this purpose (Kanshana et al., 2000; Centers for Disease Control, 2001b; Thisyakorn et al., 2000; Shaffer et al., 1999; Natpratan, 1999); confirmed its safety for the infants after 18 months of follow-up (Chotpitayasunondh et al., 2001); and enabled ARV to move from pilot phase to wider use throughout the country. Thailand continues to use AZT, with which it has considerable experience, and has not moved to the use of NVP.

In India, AZT was introduced in a PMTCT feasibility study supported by UNICEF and the National AIDS Control Organization (NACO) in 11 medical colleges of the five most affected states of India. As of March 31, 2001, 640 HIV-infected mothers had been given AZT (NACO, 2001). An analysis of this experience (NACO, n.d. [b]) revealed that, for logistical and cultural reasons, compliance was evaluated as "good" in only 54.1 percent of women (it was "fair" in 45.1 percent and "poor" in 0.9 percent). Also, the fact that women received varying doses and duration of AZT prophylaxis was a barrier to its effective use. The government concluded that the two-dose NVP regimen might be a more suitable option to overcome this problem, and subsequently launched a new feasibility study of NVP in the same 11 centers (NACO, 2001).

Although the numbers of HIV-infected women reached with NVP in India and China are still relatively small, there is some documented experience with its use for PMTCT. In India, NVP prophylaxis was used with 12 pregnant, HIV-infected women in Namakkal, a rural district in Tamil Nadu, where

BOX 5: ACTIVITIES TO SUPPORT PROVISION OF ANTIRETROVIRAL PROPHYLAXIS

- Explore means to safeguard access to essential drugs.
- Encourage intercountry bulk purchase of drugs and removal of import duties.
- Support global efforts to negotiate reduced costs of the drugs and foster partnerships among organizations to purchase drugs collectively at lower cost.
- Prepare essential drug programs to include short-course ARV drugs to prevent MTCT and longer-course ARV drugs to treat AIDS.
- Promote the local approval and licensing of MTCT prevention drugs and provide technical assistance, where needed.
- Strengthen the MCH infrastructure to use the drugs when and if they do become available.
- Conduct policy reviews and/or development related to ARV use for MTCT.
- Develop and establish guidelines for enforcing legislation and policies related to ARVs.
- Support supply and logistics aspects for management of ARV drug supplies.
- Support training and other capacity development related to the use of ARVs for MTCT.
- Support community mobilization efforts to increase acceptance of ARV prophylaxis for MTCT.
- Conduct operations research in settings where ARVs are being used.

the seroprevalence of HIV in women attending antenatal clinics was 3 percent. In this site, at birth and 60 days later, 11 of the 12 infants were HIV-1 DNA PCR negative (Samuel et al., 2001).

NVP has been used only recently in China, in Yunnan Province, and it was found to be effective and affordable for PMTCT (Zhengquan Zhou et al., 2001).

4. Counseling and support for safe infant feeding

Breastfeeding is crucial to child survival and early childhood development because of its proven health, nutrition, birth spacing, emotional, and psychosocial benefits for the infant (Preble and Piwoz, 1998). In Asia, the importance to child health of offering support for breastfeeding during the antenatal period, during the hospital stay, and through postpartum visits was emphasized recently in studies and reviews from India (Gupta, 2000) and Thailand (Li et al., 1999). It is also increasingly recognized that breastfeeding creates positive physiologic changes in the mother as well, and that these changes lead to improved short- and long-term maternal health (Labbok, 2001).

Given these benefits, the problem of HIV transmission through breastfeeding has made safe infant feeding one of the most complex and emotional aspects of MTCT prevention. Infant feeding counseling, long recognized as important for all mothers, has become even more important with the emergence of HIV.

United Nations Policies

The United Nations agencies' policy on infant feeding and HIV, first developed in 1997, emphasized the importance of informed choice. The policy states that programs should provide HIV-positive women with information and support to empower them to make fully informed decisions about how to feed their babies (UNAIDS, WHO and UNICEF, 1997).

In 1998, the United Nations agencies published guidelines for HIV and infant feeding that outline various feeding options for HIV-infected women (UNAIDS/ UNICEF/WHO, 1998). These options include commercial infant formula, home-prepared infant formula, expressed and heat-treated breast milk, early cessation of breastfeeding¹³, use of milk banks, and wet nurses. These guidelines clearly state that all women should have access to information about MTCT. While guidance on optimal breastfeeding should be given to all mothers, these guidelines stressed that information on specific replacement feeding options should be provided only for women who know they are HIV-positive and can decide which option works best for them and their families.

In 2000, WHO determined that, for mothers who are HIV-positive and for whom replacement feeding is not acceptable, feasible, affordable, sustainable, and/or safe, exclusive breastfeeding is recommended during the first six months of life (WHO, 2001b). This recommendation is a result of ample evidence on increased risks of diarrhea and other infectious diseases when exclusive breastfeeding is not practiced, as well as on the basis of limited evidence on the increased risks of HIV transmission when other liquids and foods are introduced (WHO, 2001e; WHO, 2001b). The new recommendations go further to suggest that HIV-infected breastfeeding mothers should discontinue breastfeeding as rapidly as possible, taking into account their own situation, once exclusive breastfeeding ends.

¹³ This means the early discontinuation of breastfeeding to reduce the period during which an infant is exposed to HIV through breastmilk.

Optimal Breastfeeding Practices

The degree to which the general benefits of breastfeeding are actually realized depends in large part on how breastfeeding is practiced. Women who should be encouraged to breastfeed include women who are HIV-negative, women of unknown HIV status, and HIV-positive women who cannot use replacement feeding safely, or who choose not to. For all women who choose to breastfeed, guidelines for optimal breastfeeding are (LINKAGES, 1999):

- Initiate breastfeeding within about one hour of birth.
- Establish good breastfeeding skills (proper positioning, attachment, and effective feeding).
- Breastfeed exclusively for the first six months.
- Practice frequent, on-demand breastfeeding, including night feeds.
- In areas where vitamin A deficiency occurs, lactating women should take a high-dose vitamin A supplement (200,000 IU) as soon as possible after delivery, but no later than eight weeks postpartum, to ensure adequate vitamin A content in breastmilk.
- Continue on-demand breastfeeding and introduce complementary foods around six months of age.

Exclusive Breastfeeding

Actual breastfeeding practices in Asia vary tremendously, and often are not optimal. For example, UNICEF data (2001a) show that although exclusive breastfeeding is now recommended for six months, in South Asia, only 46 percent of children are breastfed exclusively from zero to three months. In East Asia and the Pacific, the figure is only 57 percent. Rates of exclusive breastfeeding for Asian countries are found in Annex E.

However, evidence suggests that where support for exclusive breastfeeding has been implemented properly, positive results—up to 70 percent exclusive breastfeeding for at least the first three to five months—have been achieved (Haider et al., 2000; Morrow et al., 1999). The vast experience with promotion and support of breastfeeding (WHO 1998) should be considered carefully when designing programs to support exclusive breastfeeding in HIV-infected mothers. In particular, it is important to provide education and counseling for other family members, not just the mother, because in many Asian cultures, grandmothers actually provide weaning food to babies, as early as the first month of life.

Early Cessation of Breastfeeding

Early cessation of breastfeeding is one infant feeding option for HIV-positive mothers who choose to breastfeed. Indirect evidence from observational

Exclusive Breastfeeding and HIV: Potential Mechanisms for Reduced Transmission

A recent review by Smith and Kuhn (2000) postulates these biological explanations of why exclusive breastfeeding may pose less risk for HIV transmission than partial breastfeeding:

- It reduces exposure to dietary antigens and enteric pathogens, limiting inflammatory responses and maintaining gut mucosal integrity.
- It promotes growth of beneficial intestinal microflora that may modulate infant immune response and increase resistance to infection.
- Frequent breastfeeding may alter maternal hormonal and immunological capacity and affect the immunological properties of breast milk, in turn influencing infant resistance to infection.
- Early initiation, frequent breastfeeding, and complete breast emptying—characteristics associated with successful exclusive breastfeeding—may prevent breast inflammation and reduce permeability of the mammary epithelia, thereby restricting passage of HIV and reducing viral load in breast milk.

studies and mathematical modeling suggests that exclusive breastfeeding, followed by a rapid transition to exclusive replacement feeding, may be one of the safest feeding options for HIV-positive mothers (WHO, 2001e). This practice, which is still untested, provides infants with the many important benefits of breastfeeding for at least the first few months of life while reducing postnatal exposure to HIV by limiting the duration of breastfeeding (Piwoz et al., 2001).

One challenge associated with this early-cessation approach is that it conflicts directly with current infant feeding practices in many parts of Asia. Furthermore, the literature strongly suggests that an abrupt switch from exclusive breastfeeding to exclusive replacement feeding without a transition can have serious health and psychosocial consequences for mothers and infants. Infants may suffer dehydration, refusal to eat, malnutrition, psychological trauma, and lack of attachment. For mothers, abrupt breastfeeding cessation can result in engorgement, mastitis, and depression, and it can increase a mother's risk of unwanted pregnancy (Piwoz et al., 2001).

A recent review (Piwoz et al., 2001) suggests that a three-stage strategy may help HIV-positive breastfeeding mothers mitigate the risks of postnatal transmission:

- Exclusive breastfeeding —no other liquids or food—for six months or until the decision is made to stop breastfeeding if that occurs before six months of age;
- A transition period when the infant is accustomed to new feeding patterns; and
- Exclusive replacement feeding with breast milk substitutes and family foods (i.e., no breastmilk).

Early breastfeeding cessation may also be practiced increasingly as new ARV regimens come into use to prevent postnatal transmission of HIV. Studies are now underway to assess the efficacy of daily and twice weekly NVP for breastfeeding infants of HIV-infected mothers to six months of age (Shetty et al., 2001). Future studies are planned to examine the efficacy of combination ARV treatment to breastfeeding mothers for reducing HIV transmission during breastfeeding (van der Horst, 2001; Farley, 2001). In each case, mothers are likely to be encouraged to stop breastfeeding earlier than customary to reduce the risks of infant HIV exposure.

Replacement Feeding

In environments where replacement feeding¹⁴ is safe, acceptable, feasible, affordable, and sustainable, avoidance of all breastfeeding by HIV-positive women is recommended from birth (WHO, 2001b). Unfortunately, in Asia, the majority of women do not know their HIV status and the risks of significantly increased morbidity and mortality from unsafe feeding practices in resource-poor settings have been well documented (Latham and Preble, 2000; Victora et al., 1987; WHO Collaborative Study Team, 1999).

One of the major challenges to advising HIV-infected women on which infant feeding method to choose is estimating the risks of HIV transmission to infants versus the risks of morbidity and mortality associated with unsafe replacement formula feeding. A number of mathematical models have been created to estimate these relative risks.

One of the more recent of these (Walley et al., 2001) suggests that the addition of infant formula to PMTCT programs may introduce *new* risks, particularly in middle-income countries. Such countries were assumed in this analysis to be more vulnerable to “spillover”—that is, to experience an erosion of breastfeeding practices in the general population as a result of formula introduction in PMTCT

¹⁴ Replacement feeding refers to the process of feeding a child who is not receiving any breast milk from birth to about two years of age with a diet that provides all the nutrients the child needs.

programs. This phenomenon has not yet been documented; however, in real life settings, it would not be unexpected where support for breastfeeding was discontinued or diminished because of the HIV pandemic. Replacement feeding is, therefore, potentially a high-risk strategy, especially in “middle-income” countries, due to the possible spillover effect of artificial feeding to uninfected women or to the large number of women of unknown HIV status.

Several conditions must be in place and accepted before replacement feeding can increase HIV-free survival (Humphrey and Iliff, 2001). Conditions for safe replacement feeding include clean water, sterilized utensils, income with which to purchase a steady supply of commercial or home-prepared formula for meeting all of the infant’s nutritional needs, and sufficient education and motivation on the part of the mother to learn to prepare formula safely. To date, experience from Africa shows that little has been done within MTCT prevention programs to make replacement feeding safer for HIV-infected mothers in terms of improved water, hygiene, and sanitation; reduced stigma; and better counseling and education in health facilities. For data on infant feeding-related indicators in Asia (availability of safe water, income level, education of women, and current practices related to exclusive breastfeeding), see Annex E.

With the exception of Thailand, the proportion of women in the most AIDS-affected countries of Asia, such as Cambodia, much of rural India, Myanmar, and Papua New Guinea, who have access to safe, affordable, and sustainable replacement feeding options is small. In part as a result of not practicing optimal infant feeding, many Asian countries have unacceptably high rates of malnutrition and infectious disease. Clearly more support for programs to prevent pediatric malnutrition and infectious diseases is needed to reduce the risks of premature death in all children living in these high-risk populations.

In settings where governments do decide to make breast milk substitutes (BMS) available (free or at subsidized prices) for the infants of HIV-infected mothers, WHO, UNICEF, and UNAIDS recommend that this be done in a manner that is sustainable; does not create dependency on supplies that are reliant on donor generosity; does not undermine breastfeeding for the majority of infants who would benefit from breast milk; does not promote BMS to the general public or through the health care system; and assures individual infants of sufficient quantities for at least six months (UNAIDS/UNICEF/WHO, 1998). Furthermore, programs must put into place measures to ensure that mothers and other caregivers who use these products have the skills and resources needed to safely prepare and feed them to their infants.

Some infant feeding experts have been critical of pilot testing of the UNAIDS/WHO/UNICEF option of replacement feeding, particularly in settings where sponsors are providing free infant formula (World Alliance for Breastfeeding Action, 2001). Critics claim that those HIV-infected mothers who cannot afford formula are also not likely to be able to use it safely. They also maintain that “informed choice” is not truly informed when there are insufficient data on the relative risks of mortality from HIV through breastfeeding and mortality from unsafe replacement feeding. Finally, while many MTCT programs now provide free infant formula, to date, monitoring its use and impact on infant morbidity and mortality has been limited.

Within Asia, Thailand has decided to advise HIV-infected mothers not to breastfeed. In many places in Thailand, needy HIV-infected mothers are provided with free infant formula for twelve months. However, the increasing number of mothers identified who qualify and government budget cuts have made it difficult for the government to sustain this free supply of formula. Many higher-income countries in Asia (such as Singapore, Hong Kong, and Republic of Korea) may make similar

recommendations for HIV-infected women, and many women in these countries may be able to use formula and other breast milk substitutes safely. The variation in settings in Asia make the principle of “informed choice” even more important—for both health workers and mothers.

In India, the evaluation of the NACO feasibility study on administering AZT for PMTCT found increased infant mortality in babies of HIV-infected women who were given replacement feeding versus those who were breastfed for two months (although the difference was not statistically significant due to the small sample size). NACO concluded that the Government of India should have a firm policy on infant feeding practices among HIV-infected mothers due to the high risk of mortality associated with replacement feeding under unhygienic conditions and poverty. It further concluded that exclusive breastfeeding for the first four months of life, gradual weaning between four and six months, and termination of breastfeeding by the end of six months is the best possible option (NACO, n.d. [b]).

The International Code of Marketing of Breast Milk Substitutes

The International Code of Marketing of Breast Milk Substitutes was adopted in response to concerns that the inappropriate marketing of breast milk substitutes and related products was contributing to unsuitable feeding practices that placed infants (especially in developing countries) at increased risk of morbidity and mortality. The Code is intended to prevent promotion of these substitutes and products to the general public, or through the health care system (UNAIDS/UNICEF/WHO, 1998).

Implementation of the Code becomes even more important in the context of HIV and infant feeding. Apart from helping to minimize the erosion of optimal breastfeeding for the majority of infants who will benefit from it, Code implementation also protects artificially fed infants. It ensures that the choice of replacement feeding is made on the basis of noncommercial information, and that all products are labeled clearly to ensure that they will be prepared and given safely. Some countries have developed their own national codes, and these should be adhered to and enforced in all MTCT activities that have the potential to involve infant formula and other breast milk substitutes. Countries that have not implemented the Code at the national level should be encouraged to do so.

Attitudes and Practices

Understanding attitudes and practices related to breastfeeding and perceptions and stigma associated with not breastfeeding are critical for the development of appropriate interventions to reduce postnatal transmission of HIV. Some Asian cultures where breastfeeding is the norm may stigmatize women who do not breastfeed as “bad mothers.” The emergence of HIV in Asia, together with increasing efforts to test and counsel women about HIV, may exacerbate this stigma. Suggestions for reducing the stigma associated with changes in infant feeding practices among HIV-positive women include: a) educating the male partner, extended family, and community (since infant feeding decisions are rarely made by the mother alone); b) educating health workers to understand better the views of women and their families; and c) undertaking and applying the results of formative research on HIV and infant feeding attitudes and practices to design culturally sensitive training, counseling, and community mobilization programs.

Impact of Breastfeeding on HIV-Infected Mothers

Few data are available on breastfeeding and its impact on the health of HIV-infected mothers. One study from Kenya (Nduati et al., 2001) reported a three-fold higher mortality rate in HIV-infected mothers who breastfed their infants, compared with those who fed their infants with formula.

Mothers who died lost a median of 0.7 kg/month, compared with only 0.05 kg/month in those who remained alive, suggesting that the nutritional and metabolic demands of breastfeeding may have played a role in their early death. Another study from South Africa, however, showed no difference in morbidity or mortality between HIV-infected women who breastfed and formula fed (Coutsoudis et al., 2001a). WHO reviewed both studies in mid-2001 and concluded that the Kenya results do not warrant any change in current policies on breastfeeding or on infant feeding by HIV-infected women (WHO, 2001c), but they did urge that more research be conducted on this issue.

Lessons Learned

Several lessons learned about how to support safe infant feeding have already emerged from MTCT programs:

- Postnatal support for the infant feeding method of choice is essential to: a) help the mother overcome any difficulties she is having with her feeding choice; b) ensure that the chosen method is practiced safely and effectively to minimize MTCT through breastfeeding; and c) ensure that the health and nutritional benefits of her method of choice are achieved.
- United Nations guidelines on HIV and infant feeding should be adapted to local settings, and national breastfeeding policies must be reviewed and updated to ensure that language is accurate with respect to HIV and breastfeeding and is respectful of a woman's right to choose how to feed her baby.
- Health workers and others need to be sensitized about and trained in these new policies.
- Formative research is recommended to identify locally appropriate replacement feeding options as well as strategies for making breastfeeding and other feeding practices safer in the population.
- Whereas VCT pretest counseling may be conducted in groups or individually, post-test counseling about infant feeding for HIV-positive women must be conducted individually to ensure confidentiality, and to help women make the best decisions about how to care for and safely feed their babies.
- To help their clients make truly informed choices about infant feeding, health workers need adequate training to be able to understand and explain complex information about the relative risks of different feeding methods, including the increased transmission risk associated with breastfeeding and the increased mortality risk associated with replacement feeding.
- In many settings, the decision not to breastfeed comes with personal risks, including the stigma or suspicion of being infected with HIV, which sometimes carries grave social, emotional, and even physical consequences. Therefore, individual counseling must cover not only the risks of morbidity and mortality for the infant, but also the potential consequences for the mother.
- Efforts to support breastfeeding and appropriate young child feeding practices must be strengthened, especially where MTCT prevention programs are being implemented, so that health workers feel comfortable counseling all women and not only those who know their HIV-status. This is required to minimize confusion about HIV and breastfeeding and to avoid erosion of breastfeeding in the general population.

- Programs need to monitor media coverage of MTCT, including infant feeding issues, to ensure that coverage is accurate and does not create confusion about appropriate feeding practices.
- The International Code of Marketing of BMS should be translated into national legislation with adequate enforcement mechanisms in place.
- Baby Friendly Hospital Initiatives (BFHIs)¹⁵ need to continue to be supported.

Although additional research is needed to identify ways to reduce postnatal transmission of HIV among breastfeeding women, many activities can be undertaken now to improve Asian women's and families' ability to provide optimal feeding for their infants. Some of these activities are summarized in Box 6.

BOX 6: ACTIVITIES FOR SAFE INFANT FEEDING

- Review and update national breastfeeding and related infant feeding policies, especially as they relate to HIV and infant feeding.
- Review the status of the National Code for the Marketing of Breastmilk Substitutes and support efforts to enforce it.
- Support and expand Baby Friendly Hospital Initiatives and ensure that all infant feeding training includes updated information on MTCT.
- Conduct formative research to adapt United Nations guidelines on infant feeding and HIV to local settings, and to ascertain locally available replacement feeding options.
- Adapt IMCI and other feeding guidelines to local settings, as needed.
- Support training on counseling about HIV and infant feeding options (using or adapting the WHO/UNICEF/UNAIDS training package).
- Strengthen training in lactation management.
- Strengthen efforts to promote and support exclusive breastfeeding to six months for all breastfeeding mothers, including experienced breastfeeding mothers assisting and supporting new mothers (often called Mother-to-Mother Support Groups).
- Strengthen nutrition and health support for mothers, especially HIV-positive mothers, during breastfeeding, and provide skills training for HIV-positive mothers who choose replacement feeding.
- Explore ways to make replacement feeding safer for HIV-positive mothers, including clean water, food hygiene, and sanitation improvement.
- Review and update preservice training curricula for nurses, midwives, nutritionists, social workers, and all other medical/health personnel regarding MTCT issues and breastfeeding.
- Strengthen growth monitoring and promotion programs for early identification of growth faltering.
- Monitor infant feeding trends in areas of high HIV seroprevalence.
- Monitor media reporting on HIV, MTCT, and breastfeeding issues and disseminate appropriate information.

¹⁵ The Baby-Friendly Hospital Initiative (BFHI) was launched in 1992 by UNICEF and WHO to ensure that hospitals become centers of breastfeeding support. Hospitals can be certified as "baby-friendly" when they agree not to accept free or low-cost breast milk substitutes, feeding bottles, or teats, and when they implement 10 specific steps to support breastfeeding.

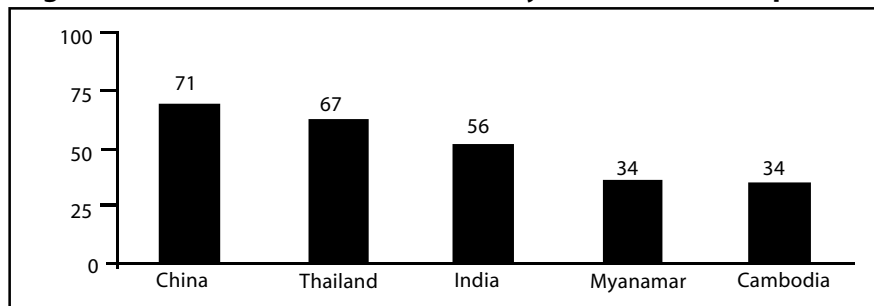
5. Optimal obstetric practices

Some countries with high rates of MTCT in Asia are also likely to have these rates superimposed on existing high rates of maternal mortality. Maternal mortality ratios¹⁶ in Cambodia, Myanmar, and Papua New Guinea are estimated to be 470 (UNICEF, 2001a), 580¹⁷, and 370 (UNICEF, 2001a), respectively. Maternal mortality statistics for other Asian countries are provided in Annex D. Improving obstetric care is critical for reducing maternal deaths. Furthermore, infants whose mothers die from delivery-related complications have a significantly lower chance of survival themselves; therefore, improving obstetric care has broader benefits than just preventing MTCT.

Births Attended by Trained Health Personnel

A major goal of improving childbirth practices is to increase the proportion of births attended by trained health personnel. Such an increase is also important for taking steps to reduce MTCT during labor and delivery. In South Asia, between 1995 and 2000, approximately 29 percent of births were attended by trained health personnel; the figure is higher in East Asia and the Pacific: 66 percent (UNICEF, 2001a). The rate varies among

Figure 5: Percent of births attended by a trained health provider



Source: UNICEF, 2001a

rate varies among AIDS-affected countries in Asia (see Figure 5). Figures for other Asian countries are provided in Annex D.

Techniques for Safe Delivery

One effective method of supporting safer delivery in general is to manage and support labor in a way that will help to keep it "normal" (Kroeger, 2001). This may be done by following simple steps, such as encouraging mothers to stay well nourished and hydrated, and to have a safe delivery plan and a contingency plan for referral. Partographs, which record the progress of labor and mother-baby vital signs, should be used routinely, and referrals should be made on the basis of this monitoring to prevent prolonged labor. Family support should be encouraged during labor, both for its psychosocial benefits and because this support may reduce the need for invasive procedures such as artificial rupture of membranes and use of instruments during delivery (Madi et al., 1999; Kennell et al., 1991). This kind of management and support will also help to reduce MTCT.

MTCT during the intrapartum period is believed to be due to the infant's exposure to infected blood and other fluids from the mother. Thus, great care must be taken to avoid practices that may facilitate this exposure, such as artificial rupture of membranes and episiotomy in cases where there is no obstetrical indication. These safer practices should be introduced as a routine part of the management of labor for all women in high-HIV-seroprevalence areas (WHO, 1999).

¹⁶ The maternal mortality ratio is defined here as the annual number of deaths of women from pregnancy-related causes per 100,000 live births.

¹⁷ This figure is the UNICEF/WHO estimate, considerably higher than the official Government of Myanmar estimate of 230.

Handling of the newborn infant in the first hours after delivery should include thorough drying to minimize heat loss and to remove any remaining maternal blood and amniotic fluid. It is not necessary to bathe the baby before giving him or her to the mother, and skin-to-skin bonding should be encouraged regardless of whether a mother has chosen to breastfeed. Vigorous suctioning of the infant's mouth and pharynx right after delivery may risk creating trauma to the mucus membranes and should be avoided unless absolutely necessary. Umbilical cord cutting and care should be handled in a way that minimizes the infant's and the health provider's exposure to blood.

Compliance with universal infection control procedures and provision of appropriate decontamination and antiseptic solutions, gloves, syringes, and other sterile equipment can help minimize risk of delivery-related HIV transmission, as well as the risk of occupational exposure—that is, health providers becoming HIV infected through contact with HIV-infected clients' blood.

Cesarean Section Delivery

Elective (scheduled) cesarean section delivery before labor and before rupture of membranes has been shown to approximately halve the risk of MTCT in industrialized-country settings (Thorne and Newell, 2000). However, many clinicians in industrialized-country settings agree that, in the absence of other obstetrical indications, elective cesarean section probably should be reserved for HIV-infected women who fail to achieve viral suppression (through drug therapy) at the time of delivery (McGowan and Shah, 2000). The cost and lack of surgical facilities preclude cesarean section delivery for most women in resource-poor settings in Asia. In addition, cesarean section delivery carries a higher chance of postoperative complications in HIV-infected women, with these complications related to the stage and duration of these women's own disease (Vimercati et al., 2000). These complications are likely to be more difficult to manage in resource-poor settings.

Other Obstetric Interventions

Disinfection of the birth canal during labor and delivery has been studied in Malawi and Kenya as a way to reduce MTCT. Results to date have not been encouraging, except in mothers who had ruptured membranes for more than four hours (Biggar et al., 1996). However, data from Kenya suggest that disinfection before the membranes were ruptured might be associated with a reduction of MTCT, especially with higher concentrations of chlorhexidine (Gaillard et al., 2001). In any case, this practice may help to reduce neonatal and puerperal sepsis, irrespective of HIV status (Taha et al., 1997).

Techniques that reduce the risk of obstetrical emergencies that necessitate blood transfusions for the mother are recommended. In some settings in Asia, the blood supply is not consistently safe from, or tested for, HIV. In India, for example, a national survey demonstrated that HIV seroprevalence is high in Indian blood donors (Choudhury et al., 2000).

Safe Motherhood Programs and HIV/AIDS

In-service and preservice training curricula currently in use for Safe Motherhood should be reviewed for their appropriateness in the face of HIV and MTCT, and revised as needed. Life-saving skills training for midwives offers an ideal time to update practices that are detrimental to all mothers and can put them at greater risk for MTCT to their infants. Policies related to routine, but nonessential, delivery procedures that may increase infant contact with maternal blood unnecessarily should be reviewed and revised.

Safe motherhood and reproductive health programs are advised to implement steps to reduce the risk of MTCT during delivery. Box 7 includes steps that programs can take to reduce MTCT through improved obstetric practices.

BOX 7: ACTIVITIES FOR OPTIMAL OBSTETRIC PRACTICES

- Train health workers in safe delivery techniques and life-saving skills for mothers and infants.
- Provide safe delivery kits and essential obstetric drugs.
- Provide a safe delivery infrastructure with a clean water source, good drainage, electricity, delivery beds covered with a waterproof material, antiseptics, gloves, and other materials required for a hygienic delivery environment.
- Ensure a safe blood supply and minimize the need for delivery-associated transfusions.
- Provide community education about the importance of antenatal care and deliveries assisted by MTCT-trained attendants.
- Review and update preservice obstetrical curricula for appropriateness in the face of HIV and MTCT.
- Review and update Safe Motherhood programs and policies for attention to HIV and MTCT.
- Improve the capacity of health systems and providers to monitor and supervise obstetrical services and practices.
- Monitor the status of research on innovative obstetrical practices that might reduce MTCT and update policies and programs as needed.

V. CARE AND TREATMENT

A. Care and treatment for infants and children

For those infants who do acquire HIV infection from their mother in the absence of MTCT prevention interventions, or in cases where these interventions are not effective, early diagnosis of HIV, through laboratory tests or clinical algorithms, and medical care and support are critical.

Management of Pediatric HIV/AIDS in the United States

Significant progress has been made in the medical management of children with HIV infection in industrialized countries during the past five years. Efforts reportedly are shifting from caring for children with advanced immunosuppression and severe opportunistic infections to introducing early antiretroviral therapy, maintaining the immune system, and preventing opportunistic infections (Laufer and Scott, 2000). As a result of greatly improved treatment, dramatic improvements in the quality of life and length of survival of U.S. pediatric AIDS patients have been observed (Laufer and Scott, 2000). The gap has widened significantly between standards and protocols for care in the United States and in resource-poor settings.

Clinical Symptoms of Pediatric AIDS in Resource-Poor Settings

The most common symptoms of pediatric AIDS seen by clinicians in Africa have been growth failure, enlarged lymph nodes, persistent diarrhea, pulmonary infections, chronic cough, and chronic fever. Experience with the diagnosis and treatment of pediatric AIDS has been more limited in Asia, due to the more recent emergence of the disease and the relatively small number of cases to date. However, experience is growing from countries such as Thailand and India. In Thailand, recent studies on

oral manifestations in HIV-positive children (Khongkuntian et al., 2001) and intestinal microsporidia in HIV-infected children with acute and chronic diarrhea (Leelayoova et al., 2001) will help advance improved treatment modalities.

In India, one study of 202 hospitalized HIV-infected children (Khanna et al., 2001) recorded their clinical spectrum, finding that the most common clinical illnesses seen in these patients were hepatosplenomegaly (83 percent), severe protein energy malnutrition (79 percent), tuberculosis (73 percent), generalized lymphadenopathy (48 percent), extensive oral candidiasis (44 percent), recurrent skin lesion (41 percent), and persistent infiltrates on chest radiogram (39 percent).

Management of Pediatric HIV/AIDS in Resource-Poor Settings

HIV has also transformed pediatric practice in many developing countries. Disease progression in children who acquire HIV infection from their mothers is more rapid in developing than in industrialized countries, probably because many developing-country children are exposed to early and multiple infections, have high rates of malnutrition and micronutrient deficiencies (Dray-Spira et al., 2000), and have limited access to health care. Pediatric HIV/AIDS symptoms, which resemble common child health problems, do not respond in a normal fashion to common treatments.

A specialty [pediatrics] that once dealt mainly with acute illnesses is now consumed, in many settings, with managing chronically ill and dying children.

—Salojee and Violari, 2001

Recent studies have shown that at least one-third of HIV-infected children in developing countries die within the first year of life (Dabis et al., 2000a). In India, this rapid disease progression has been documented, and it has also been noted that children have higher HIV viral loads than adults, and they have recurrent invasive bacterial infections more often as well (Salojee and Violari, 2001).

In Thailand, a recent study investigated the clinical and survival patterns of 90 pediatric AIDS patients who had acquired HIV from their mothers. The two most common first symptoms were chronic diarrhea (36.7 percent) and persistent lower respiratory tract infection (34.4 percent). The median age at the first symptom was four months, and the median age at AIDS diagnosis was 13 months. A survival curve was calculated, revealing that the one- and two-year survival rates from the time of the first symptom were 75.3 percent and 60.3 percent, respectively. The corresponding one- and two-year survival rates from actual AIDS diagnosis were 59.7 percent and 42.8 percent, respectively (Lumbiganon et al., 2000).

Four categories of preventive interventions have been suggested to reduce HIV-related morbidity and mortality in African children, and these are also likely to be appropriate in some Asian settings. These include drug prophylaxis (to prevent *Pneumocystis carinii* pneumonia, bacterial infectious complications, and tuberculosis); routine immunizations as recommended by the WHO Expanded Programme of Immunization and antipneumococcal immunization; micronutrient supplementation (particularly vitamin A); and prevention and early treatment of malnutrition (Dray-Spira et al., 2000). Thus, children with HIV/AIDS are a challenge for health providers and health care systems.

IMCI and Pediatric HIV/AIDS

The current approach to treating sick children in developing countries, endorsed by the World Health Organization (WHO), the United Nations Children's Fund (UNICEF), and others, but not yet

universally practiced, is the Integrated Management of Childhood Illness (IMCI). This approach combines improved management of childhood illness with aspects of nutrition, immunization, and maternal health. It replaces or complements a number of formerly “vertical” child health programs that were aimed at specific groups of conditions, including control of diarrheal diseases (CDD), acute respiratory infection (ARI), and the expanded program of immunization (EPI) (Nicoll, 2000).

One challenge in countries with high seroprevalence rates has been how to integrate pediatric HIV/AIDS diagnosis and treatment into this IMCI approach. The IMCI guidelines now recommend that health workers receive special training in how to treat children suspected of HIV infection in countries where more than 2 percent of the adult population is HIV-infected. This includes managing children who do not respond to standard IMCI treatment protocols, have signs and symptoms of HIV infection, or have an epidemiologic history suggestive of HIV (WHO, 2000a; Lepage et al., 1998).

ARV for Treatment of Pediatric HIV/AIDS

ARV drugs for the treatment of HIV/AIDS in children may be available and affordable in some Asian settings. Although the pathogenesis of HIV and the general principles underlying the use of ARV therapy are similar for adults and children, there are unique considerations for infants, children, and adolescents. The U.S. Public Health Service has developed guidelines that discuss these issues (U.S. Public Health Service, 2001).

Determination of which ARV combination is appropriate for a given child will depend upon a number of factors, including drug availability, the age of the child, whether the child is symptomatic or asymptomatic, whether the mother had ARV treatment and, if so, what kind, and the potential for adherence to therapy (U.S. Public Health Service, 2001). Clinicians need to be able to monitor the infection, change therapy if required, and manage complications.

In India, ARV drugs like zidovudine, lamivudine, stavudine, nevirapine, and indinavir are often available from local producers and are used in symptomatic patients, but treatment guidelines for pediatric populations in India still need to be developed (or modified based on U.S. guidelines). At the present time in India, the emphasis remains on prevention and treatment of opportunistic infections like tuberculosis and *Pneumocystis carinii* and on prevention of perinatal transmission with zidovudine (Kaul and Patel, 2001).

In Thailand, National Guidelines for the Clinical Management of HIV Infection in Children and Adults, including a section on ARV use in children, are available. The number of HIV-infected Thai children receiving ARV treatment has increased since the Thai Ministry of Health expanded its ARV program in 2000.

The Role of Nutrition

As with adults, malnutrition and HIV/AIDS are linked inextricably in infants and children. For the most part, specific nutritional recommendations for children with HIV should follow the recommendations for all young children, taking into consideration the increased nutritional requirements that accompany the infection and the increased likelihood of fat and other nutrient malabsorption. Guidelines for the nutritional management of children living with HIV/AIDS in Africa are now available (Piwoz and Preble, 2000), and most of these are applicable to Asian settings.

Palliative Care

In the absence of sophisticated treatment, palliative care *is* feasible, affordable, and appropriate for infants and children living with HIV/AIDS. Palliative care is a philosophy of care that combines a range of therapies with efforts to achieve the best quality of life possible for children (and adults) who are suffering from life-threatening and ultimately incurable illnesses such as AIDS (UNAIDS, 2000b).

Social Support

Social support, as well as health care, is also indicated for infants (and their mothers or caretakers) affected by HIV/AIDS. Many Asian children now live in communities where the AIDS epidemic has severely weakened the economic base and the social fabric through illness, death, and related losses in productivity. Some children have family members living with HIV/AIDS, causing psychological stress and economic hardship. Others have already lost their mother and/or father to the disease, making them orphans in an environment of limited social support. Even in settings where intensive MTCT prevention packages are introduced, and the total number of HIV-infected children is reduced, there will still be HIV-positive children born and orphans needing care and support, since none of the MTCT interventions is 100 percent effective (Connolly et al., 1998).

A number of care models, lessons learned, and best practices are now available that deal with care for those who are ill, improving nutrition, helping to acquire basic medications, reducing stigma and psychological distress, keeping children in school, protecting children's legal rights, and compensating for lost adult labor and income (Williamson, 2001). Despite these models, most programs have reached only a small fraction of vulnerable children who suffer directly or indirectly from HIV/AIDS (Williamson, forthcoming).

As noted earlier, for care and support services to be put to maximum use, referral links between VCT services and these services need to be established.

BOX 8: ACTIVITIES FOR PEDIATRIC HIV/AIDS CARE AND SUPPORT

- Provide simple treatment drugs for complications of HIV and other routine health problems in mothers and infants.
- Integrate pediatric HIV/AIDS diagnosis and care into IMCI curricula and training programs.
- Train health workers in basic elements of palliative care.
- Provide lab tests for diagnosis of HIV infection in infants.
- Provide vaccines for immunization programs, micronutrient supplements, and training for nutritional management.
- Improve nutrition counseling and support (which may help slow disease progression and minimize opportunistic infections in HIV-infected mothers and children).
- Provide counseling for families with HIV-infected children to discourage abandonment of these children.
- Provide psychological support (and grief counseling where indicated) for HIV-infected children.
- Provide AIDS education to village childcare centers and school settings to decrease the stigma against HIV-infected children and their families.

B. Care and Treatment for the Mother

On the other end of the prevention-to-care continuum, many health experts have questioned whether enough attention is paid to caring for the HIV-infected *mother* herself. On the medical side, this involves both the treatment of HIV disease and the prevention and treatment of opportunistic infections. Even within Asian countries, inequalities in care for women with AIDS are striking, between those with the financial means to access ARVs in some form, and those for whom aspirin is the only treatment.

Improving maternal health through offering comprehensive antenatal and postnatal care and support not only may help to reduce the risk of MTCT but also may improve overall health and nutrition, improve birth outcomes, and reduce maternal mortality (which is associated, in turn, with infant and child mortality¹⁸). The initiation of programs to provide health care, nutrition, and social support for women living with HIV/AIDS may actually increase demand for VCT and MTCT interventions, since women have somewhere to turn to for help after learning they are HIV-positive. Care and support programs can serve as entry points for MTCT prevention at the community level.

As HIV epidemics mature, a larger proportion of women appearing for PMTCT services already will have progressed from asymptomatic HIV disease to symptomatic AIDS. In Thailand, about 10 percent of women who are diagnosed through antenatal screening are sick with AIDS-related illnesses (Kanshana, 2001).

Health Services and HIV/AIDS Care for Women

Just as women are more vulnerable to HIV acquisition than men, there also appear to be differences in their response to AIDS itself. Data from the United States indicate that women appear to have a greater risk of progression to AIDS than men with the same viral load (Hewitt et al., 2001). Early health care services can prevent and treat the opportunistic infections and other conditions that diminish women's quality of life, shorten their survival time with AIDS, and impede their ability to care for their children. Such services can also link them with health and social care and support services for them and their families.

Simple palliative care for women with AIDS, when it is the only care available, can ease the common symptoms of AIDS, which may include pain; diarrhea and constipation; nausea, vomiting, anorexia, and weight loss; cough and shortness of breath; malaise, weakness, and fatigue; fever; and skin problems (UNAIDS, 2000b). Palliative care can also address depression, suicidal inclinations, and other psychological problems.

ARV for the Treatment of HIV/AIDS in Women

Short-course AZT or NVP given to pregnant, HIV-infected women for PMTCT will not be of long-term benefit for the mothers themselves. No single drug can counteract viral infection, and pregnant women with advanced HIV infection require combination therapy with at least two or three drugs to reduce their own AIDS-related morbidity and mortality.

Highly active antiretroviral therapy (HAART) using several ARV drugs is already used in many resource-rich Asian settings in much the same way it is used in the United States, Europe, and Australia. HAART therapy, including the use of potent protease inhibitors to treat HIV infection, and the introduction of

¹⁸ In a study in Nairobi, Kenya, children born to HIV-infected mothers who died during their children's first two years of life were six to eight times as likely to die as well than children whose mothers were still alive in the 24-month follow-up period (Nduati et al., 2001).

tests to monitor viral responses to therapy have decreased morbidity and mortality rates dramatically in resource-rich settings (Newshan and Hoyt, 1998).

In resource-poor regions of Asia, use of HAART has been constrained or prohibited by the high cost of the drugs and the lack of a health infrastructure necessary to use them. Even in Thailand, although the cost of the triple regimen is declining substantially, many patients still cannot afford it (Ruxrungtham and Phanuphak, 2001). The Government of Thailand started an ARV supply program in 1992, primarily for low-income groups, but coverage has been limited because of the large number of patients requesting the drugs and the increasing prices of newer drugs (Kunanusont et al., 1999).

In India, several firms are producing relatively low-cost formulations of ARV drugs such as zidovudine (ZDV/AZT), 3TD, D4T, ddI, and NVP. But even here, researchers report that many patients stopped taking these drugs because of the high cost of therapy (Kumarasamy et al., 2000). These researchers recommend that physicians should prescribe ARV drugs only after ensuring that the patients can afford them and will comply with long-term treatment.

In terms of management of the drugs, even in industrialized countries, a significant proportion of persons living with HIV/AIDS discontinue HAART because of side effects caused by the long-term toxicity of these drugs. In addition, some data from the United States indicate that women have an increased risk of adverse drug reactions from HAART (Hewitt et al., 2001). Noncompliance by patients due to side effects or cost can cause resistance to the drugs over time. Nevertheless, many advocacy groups are challenging the notion that management of these drugs is not feasible in resource-poor settings. In new evidence from Haiti, for example, researchers demonstrated that it is feasible and effective to offer HAART to AIDS patients in resource-scarce settings using the directly observed therapy (short course) (DOTS) approach of chronic infectious disease with multidrug regimens, provided there is a sustained commitment to free, uninterrupted care for the patient (Mukherjee et al., 2001).

Safety and Toxicity in Women

By necessity, ARV drugs have become widely prescribed in pregnancy in the absence of proof of safety (Taylor and Low-Beer, 2001). Of the ARVs commonly used, ZDV has been studied the most, and to date, no excess serious adverse events in mothers and infant have been observed (Wilfert, 2001).

Recent U.S. Public Health Service recommendations for the use of ARV drugs in pregnant HIV-1-infected women for maternal health and to reduce MTCT include the following:

Although considerations associated with pregnancy may affect decisions regarding timing and choice of therapy, pregnancy is not a reason to defer standard therapy. The use of antiretroviral drugs in pregnancy requires unique considerations, including the potential need to alter dosing as a result of physiologic changes associated with pregnancy, the potential for adverse short- or long-term effects on the fetus and newborn, and the effectiveness for reducing the risk for perinatal transmission. Data to address many of these considerations are not yet available. Therefore, offering antiretroviral therapy to HIV-1-infected women during pregnancy, whether primarily to treat HIV-1 infection, to reduce perinatal transmission, or for both purposes, should be accompanied by a discussion of the known and unknown short- and long-term benefits and risks of such therapy for infected women and their infants. Standard antiretroviral therapy should be discussed with and offered to HIV-infected pregnant women....(U.S. Public Health Service, 2002).

In terms of side effects of HAART during pregnancy, tolerability may be even more important than usual, especially if these drugs exacerbate common complications of pregnancy such as vomiting and glucose intolerance (Taylor and Low-Beer, 2001). Finally, there is some evidence that women on combination therapy initiated before pregnancy were twice as likely to deliver prematurely as those starting therapy in the third trimester (European Collaborative Study, 2000).

Tuberculosis and HIV/AIDS

One of the major opportunistic infections Asian clinicians will have to prevent and treat in women, related to HIV, is tuberculosis (TB). The Centers for Disease Control and Prevention (CDC) recommends that everyone infected with HIV should be tested for TB and, if infected, complete preventive therapy as soon as possible to prevent TB disease (CDC, 2001c). Both TB and HIV are significant among women of childbearing age, and TB, although uncommon in pregnancy, is on the increase (Thillagavathie, 2000). More than half of all global incident TB cases in 1997 occurred in five South East Asian countries (Dye et al., 1999). It is important to note that pharmacologic interactions can result when patients receive protease inhibitors and nonnucleoside reverse transcriptase inhibitors (NNRTIs) for treatment of HIV together with rifamycins for the treatment of TB. Guidelines have been developed for management of these drug interactions (CDC, 2000).

Social Support for Women

In addition to medical care, social support is important for mothers with HIV/AIDS. A study in Thailand (Manopaiboon et al., 1998) assessed changes in the family situation of HIV-infected women who had given birth. Findings showed that when comparing women's status at delivery with their status 18 and 24 months after giving birth, more women were living alone (6 percent versus 1 percent); fewer women were living with their partners (98 percent versus 73 percent); and 30 percent of families had reduced incomes. The women's greatest worries were about their children's health and family's future, and signs of depression and isolation were present. Researchers concluded that providing family support will be an important challenge in Thailand as the perinatal HIV epidemic progresses.

In another site in Thailand, a health care delivery model was strengthened to meet HIV-infected mothers' complex needs and to increase their coping ability, quality of life, and adaptation to their role as mothers. The five components involved were peer group meetings, professional support on infant rearing and maternal self-care, stress management, access to available social support, and alternative medicine. Mothers reported experiencing greater autonomy, accountability, and collegiality and more effective communication from the empowerment program (Jirapaet, 2000).

BOX 9: ACTIVITIES FOR CARE AND SOCIAL SUPPORT FOR MOTHERS

- Document and disseminate best practices in care and support.
- Provide training and supplies for home-based care.
- Provide supplies for community gardens and other agricultural programs.
- Provide training in community-level economic development strategies (such as microfinance services).
- Foster community-based support for AIDS orphans.
- Support projects to protect legal rights of persons living with HIV/AIDS.
- Incorporate MTCT prevention education into vocational training, agricultural extension, school feeding, and other relevant programs reaching men and women in groups or in educational settings.
- Link HIV/AIDS-affected households that are participating in microfinance and other income-generating programs, with MTCT services.
- Target all lactating women for additional food intake.

IV. OPERATIONAL ISSUES

A. Assessing the situation

No predefined blueprint exists for introducing or scaling-up MTCT interventions within existing programs. Rather, countries must assess the situation to identify the starting points and the necessary actions at all levels. Below is a list of important issues to be assessed.

Epidemiologic

- The stage of the HIV/AIDS epidemic (degree to which the epidemic has moved from initial high-risk groups to the general population of women of reproductive age)
- The extent of the problem (age and gender-specific infection rates; overall number and proportion of HIV infections in infants; and effect of MTCT on infant and child mortality)
- The predominant transmission patterns and the risks of IDUs serving as a bridge to the heterosexual population

Political

- Government political will and commitment to preventing MTCT
- The appropriateness of government and health system policies related to HIV/AIDS and MTCT, and the degree to which these policies are monitored and enforced
- The level of funding available for MTCT and supporting interventions
- Supportive laws and policies to protect HIV-infected persons from discrimination

Health and Related Systems

- The status of existing MCH coverage and quality, HIV and MTCT prevention activities
- The availability, quality, and use of health services and the health system's readiness to deliver MTCT interventions (including human resources/capacity and infrastructure)
- Existing health worker training through preservice and in-service channels

- The availability, possible entry points, and existing or potential demand for voluntary and confidential testing and counseling for HIV
- Drug licensing and policies, supply, and logistics systems (for all essential MCH drugs, ARVs, and other drugs for HIV- infected women and children)
- Availability of ARV for prevention of MTCT and pilot experience with MTCT programs
- HIV test kit availability and quality control for VCT
- Infant feeding policies and laws related to the marketing of breast milk substitutes
- Level of implementation of the Baby Friendly Hospital Initiative (BFHI)
- Availability, quality, and reach of family planning services
- Availability of safe water, hygiene and sanitation, and replacement feeding options

Community and Family

- Community awareness, knowledge, and attitudes about pregnancy in general, HIV, MTCT, and VCT (perception of the problem, presence of stigma, attitudes about learning one's status, etc.)
- Male involvement in HIV prevention and MTCT programs and in care of children
- The existence of support groups and other services for people with HIV/AIDS.

Health-Related Practices

- Attitudes toward family planning and family planning acceptance rates
- Common obstetrical practices by traditional birth attendants, midwives, obstetricians, etc.
- Prevalent infant feeding attitudes and practices

B. Planning through dialogue

As with other development programs, it is essential to understand MTCT from the perspective of the community before designing large-scale MTCT prevention programs. In addition to conducting the general situation assessment, formative research is essential to plan different activities, such as placing and promoting VCT services, developing strategies for enhancing the acceptability of ARVs, developing messages and materials for infant feeding counseling, and deciding on the types of training needed for health and lay workers involved in MTCT activities (Nyblade and Field, 2000; NFNC et al., 1999). Target groups for such studies include health workers, traditional birth attendants, women and their partners, community leaders, and other influential community members. Some tools for conducting formative research for MTCT components, such as VCT and infant feeding, already exist (SARA et al., 1999).

Training of health and community-based organization workers with regard to MTCT is likely to be a major component of all MTCT programs. Basic information on MTCT is lacking in most countries, creating confusion and misinformation on the ground.

During the planning and implementation stages of MTCT prevention programs, national (and district-level) MTCT working groups are useful to coordinate and make technical decisions about various aspects of MTCT interventions. These groups can also advocate MTCT prevention and move the agenda forward.

C. Monitoring and evaluation

Since MTCT prevention is a relatively new area, operations research and careful monitoring and evaluation will be necessary to understand the costs, effectiveness, acceptability, and other characteristics of various packages of interventions, and to develop strong, evidence-based programming for MTCT prevention programs and policies in the future. Demonstrating the efficacy of PMTCT programs in reducing vertical transmission of HIV will be essential to convince policy makers to support PMTCT efforts.

Four program indicators already have been recommended for use by National AIDS Control Programs to measure MTCT service provision (UNAIDS, 2000c; USAID, 2000). By necessity, these indicators measure service delivery rather than impact, because of the high cost and methodological complications of conducting HIV surveillance to assess changes in actual rates of vertical transmission. Additional indicators to monitor *all* the core MTCT interventions described in this paper, including antenatal service provision, intrapartum practices, family planning counseling as part of VCT, and infant feeding choices and patterns, should be developed and put into practice immediately.

The existing indicators are:

- *The percent of pregnant women who were counseled during antenatal care for their most recent pregnancy, accepted VCT, and received test results.* This broad measure of service provision recognizes the importance of knowing one's HIV status to access MTCT prevention interventions. Data are collected through general population surveys.
- *The proportions of public antenatal clinics that offer VCT services (by trained staff) or refer clients for VCT services.* This indicates the extent to which the national program is able to scale-up interventions that are often begun on a pilot basis. This indicator is measured through health facility surveys.
- *The percent of post-test counseling sessions (for women attending antenatal clinics) offering counseling and VCT that meet international standards for quality counseling.* This indicator is based on observation of post-test counseling sessions and is undertaken through health facility surveys.
- *The percent of women testing HIV-positive at selected antenatal clinics in the last year who are provided with a complete course of ARV therapy to prevent MTCT, according to national/international guidelines.* This is measured through reviews of client records and records of HIV test results. This percentage is likely to be extremely low in many countries because VCT services are still currently scarce and ARV prophylaxis is still limited.

In addition to improving the coverage and range of services offered, improving the *quality* of service delivery is critical. This applies to all aspects of MTCT care, including staff training, supervision, and staff motivation. Not only can attention to quality assurance/quality improvement facilitate the effective integration of MTCT prevention components, it will benefit the health of mothers and children overall.

D. Policy issues

The unique attributes and severity of the HIV/AIDS pandemic, as well as the variety of creative scientific and behavioral interventions available to address it, have challenged governments and organizations to review a range of existing policies and develop new policies in formerly unforeseen areas. MTCT policy dialogue can no longer be undertaken only at the level of scientists and national government, but requires the education and participation of communities, including people living with HIV/AIDS.

Primary prevention programs and, now, MTCT programs, must confront policy decisions related to the explicitness and reach of AIDS prevention messages of a highly personal and sexual nature, especially for young people. VCT programs, as noted previously, require specific policies to preserve and protect clients' confidentiality. The dilemma of HIV transmission through breastfeeding has required countries to review their national and local infant feeding guidelines and to assess policies related to the acquisition, marketing, and use of infant formula.

Regarding infant feeding, Asian countries that have not yet introduced the International Code of Marketing of Breast Milk Substitutes and other relevant World Health Assembly (WHA) resolutions into their national legislation should do so as soon as possible.

Regarding ARVs, as MCH services begin to offer short-course ARV prophylaxis, they will require new policies to ensure the safe and effective use of the drugs and to determine the safest and most efficacious means of distribution. New policies for health worker training and supervision also will be needed to administer ARVs for both prevention of MTCT and treatment of women and children with HIV/AIDS.

VII. EXISTING MTCT PREVENTION EFFORTS IN ASIA

By early 2001, most governments in high-prevalence countries in Asia had developed policies for PMTCT and had endorsed establishment of pilot projects to begin addressing it. However, initiation of actual MTCT prevention projects on any significant scale has lagged behind the policy-level commitment in any high-prevalence Asian countries other than Thailand.

In the Asia region, **Thailand** has come closest to approximating the progress in reducing MTCT made by industrialized countries. Thailand has taken MTCT seriously, not only contributing significantly to advancing the research of ARV use for prevention of MTCT, but also gaining vast program experience by establishing and carefully evaluating a number of MTCT pilot projects. Thailand's extensive pilot project experience has been well evaluated and documented and has enabled the country to go to scale with many MTCT prevention interventions.

In 1998, to implement the large pilot project in Region 7 in northeastern Thailand, the Ministry of Public Health of Thailand collaborated with other organizations to identify simpler and more cost-effective ZDV regimens and other interventions to reduce MTCT. A placebo-controlled clinical trial introduced VCT into public antenatal services, used a simplified ZDV regimen from 36 weeks' gestation until delivery, and provided free infant formula for 12 months. The program was shown to reduce the risk of MTCT, and program feasibility, effectiveness, and acceptability were measured. During this two-year period (1998-2000), more than 100,000 new antenatal clinic clients were tested

for HIV, and approximately 1 percent were found to be HIV-positive. After two years, the study concluded that acceptance of HIV testing and adherence to ZDV was high, and HIV transmission was reduced from approximately 30 percent to approximately 10 percent (CDC, 2001b).

Region 10 of Thailand incorporates six provinces in the northern part of the country. The HIV prevalence among antenatal clinic attendees in this region had peaked at 6.7 percent in 1995, and, by 1999, had dropped to 3.46 percent. The objective of the pilot study was to provide the modified short-course ZDV for all infected pregnant women and their newborns in six provinces, and to evaluate the effectiveness of this program from 1997 onward. This pilot project reduced the MTCT rate to approximately 8 percent (Natpratan, 1999).

The Thailand models may be considered a “gold standard” in Asia since the program offers VCT on a wide scale; uses a relatively long course of ARV; provides free infant formula for an extended period along with instruction on its safe use; and has “gone to scale” across the country. This comprehensive model may not be feasible, however, for other resource-constrained settings in Asia today. In these settings, programs targeted to high-risk districts; simpler strategies, which include the use of NVP; strengthened MCH services; and counseling on safer breastfeeding practices may be more appropriate for early introduction of PMTCT programs.

Below is a brief summary of the status of PMTCT programs in selected high-prevalence Asian countries:

- In **Cambodia**, PMTCT policy was finalized in mid-2000. Its main objective is to improve the acceptability, accessibility, and quality of health services and information on reproductive health and HIV/AIDS/STIs. The Government of Cambodia recognizes that maternal care services are limited, so the feasibility of providing a package of MTCT prevention services through antenatal, peripartum, and postpartum care must be studied. To achieve this, three pilot projects have been established: Battambang Referral Hospital; the National Maternal and Child Health Center (NMCHC), Phnom Penh; and Calmette Hospital, Phnom Penh. The first is primarily a research site and has been underway for some time. The other two are primarily operational and planned to begin offering services toward the end of 2001.
- In **India**, various approaches to MTCT prevention already are used in a number of sites. At a perinatal HIV clinic at a university-affiliated maternity hospital in Bombay, for example, a study was undertaken to evaluate the efficacy of a package of interventions that included AZT for the mother, cesarean section delivery before rupture of membranes, oral AZT powder for the infant, and avoidance of breast milk. At the time of the first analysis, this strategy seemed to reduce MTCT, significantly; however, the analysis also suggested that the findings needed to be substantiated by larger studies (Merchant et al., 2001).

In March 2000, a feasibility study of MTCT prevention was undertaken in 11 medical colleges in the five most affected states in India. Components include routine antenatal VCT, short-course AZT regimen, provision of iron folic acid and vitamin A, and counseling on infant feeding practices. Babies receive an 18-month follow-up and are tested for HIV with PCR at 48 hours and at two months. As of the end of March 2001, more than 150,000 antenatal women were reached; 79 percent of these women were counseled, 77 percent were tested, 1.8 percent were found to be HIV-positive, and over 600 mothers were provided with AZT (NACO, 2001).

The major constraints encountered by the program were late antenatal coverage with a low rate of institutional deliveries (counseling being a new concept among clients and service providers), maintaining confidentiality, social stigmatization, the low rate of exclusive breastfeeding, and insufficient links between the program and the communities. By 2003, MTCT prevention is to be integrated into the existing national reproductive and child health programs (Vincent, 2001).

- In **Myanmar**, discussions about prevention of MTCT began in 1998. In 2000, activities started with a feasibility assessment in two townships where HIV infection among pregnant women is especially high (Tachileik in Eastern Shan State, and Kawthaung in Tanintharyi Division). PMTCT intervention programs for these areas were designed that included strengthening of primary prevention, introduction of VCT, provision of NVP for HIV-positive pregnant women and their newborn babies, improved obstetric and postnatal care, counseling on infant feeding practices, and improved birth spacing. By the end of 2001, the government and UNICEF plan to have seven townships implementing MTCT prevention activities. Five additional townships will be added each year, for a total of 27 townships by the end of 2005 (UNICEF, 2001b). A study of infant feeding practices and feeding options for HIV-positive mothers also is being carried out in 2002 (Williams, 2001).

VIII. CONCLUSIONS AND RECOMMENDATIONS

As the prevalence of HIV increases in Asian women of reproductive age, an increasing number of Asian infants are contracting HIV/AIDS through MTCT. This has the potential to undermine child survival gains made in earlier years through comprehensive child health programs. However, a number of interventions are now available to reduce the risk of MTCT. These interventions vary in their cost, potential impact, and ease of delivery.

The Asian region is characterized by highly diverse epidemiological patterns, both within and among countries. The region also shows great diversity in the availability of financial resources, human resources, and health systems infrastructure available to promote MTCT prevention.

While most governments in high-prevalence countries in Asia have developed policies regarding prevention of MTCT and endorsed establishment of pilot projects to begin addressing the situation, initiation of actual MTCT prevention projects on any significant scale has lagged behind in high-prevalence countries other than Thailand. In addition, the demands for care and treatment of infants, children, and adults living with HIV/AIDS are increasing. Care, treatment, and social support must be put in place as the last, critical part of continuum that begins with primary prevention of HIV in women and prevention of MTCT.

Asian governments need to assess their national and subnational HIV epidemics and assess their situation with respect to MTCT. Such an assessment should consider the resources available and the most feasible and appropriate selection of PMTCT interventions, as described in this paper. Using the guidelines presented in this review, all governments can begin today to address the present and future challenges of MTCT. The following actions are recommended to meet these challenges:

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- Review the HIV/AIDS epidemiology in each setting.
 - Ensure support for primary prevention of HIV/AIDS (through condom promotion and provision, behavior change communication, prevention and treatment of STDs, policy reform, etc.).
 - Ensure that safe, voluntary contraception is available to prevent unwanted pregnancies, especially in HIV-infected women.
 - Review existing maternal and child health services and infrastructure to prepare those services to enable them to add prevention of MTCT services.
 - Identify opportunities to support core MTCT interventions, including VCT, ARV, safe infant feeding, and optimal obstetric practices.
 - Engage in discussions with all stakeholders and partners to develop national strategies for MTCT prevention and to assure adequate funding.
 - Support operational and clinical research in MTCT prevention, as necessary.
 - Link prevention activities with care and support activities for families and communities affected by HIV/AIDS.
 - Contribute toward the creation of an enabling environment for HIV prevention (including PMTCT).
 - Periodically review MTCT prevention packages for continuing relevance and appropriateness, given the rapid changes in behavioral, biological, and pharmaceutical knowledge and advances.

Acting today can prevent thousands of cases of pediatric HIV and the unnecessary suffering of many families and children across Asia as a result of this devastating epidemic.

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ANNEX A: CHARACTERISTICS OF HIV/AIDS IN SELECTED RESOURCE-POOR COUNTRIES IN ASIA

COUNTRIES BY CATEGORY	TOTAL POPULATION (000s) in 1999	EST. ADULT HIV+ RATES		MAJOR ROUTES OF TRANSMISSION			EST. HIV+ RATES IN FEMALE ANTE-NATAL CLINIC ATTENDEES (MEDIAN IN 1999)		EST. NO. OF WOMEN 15-49 LIVING WITH HIV/ AIDS (end- 1999)
		%	Year	HET	MSM	IDU	In major urban areas	Outside major urban areas	
High-HIV- Prevalence Countries ¹									
Cambodia	10,945	2.77	2000	+++	-	-	3.8	2.3	71,000
Myanmar	45,059	1.99	1999	+++	-	++	0.65	1.5	180,000
Thailand	60,856	1.85	2001	+++	-	++	1.28	1.71	305,000
Moderate-HIV- Prevalence Countries ²									
India	998,056	0.75	2000	++	-	+	2.0	0.3	1,300,000
Papa New Guinea	4,702	0.60	2000	++	-	-	0.2	0	2,600
Malaysia	21,830	0.36	2000	-	-	++	0.03	0.05	4,800
Nepal	23,385	0.30	2000	+	-	++	0	0	10,000
Viet Nam	78,705	0.29	2000	+	-	++	0.17	0	20,000
Pakistan	152,331	0.10	1999	-	-	++	0	0	15,000
Low-HIV- Prevalence Countries ³									
Indonesia	209,255	0.09	2000	-	-	++	n/a	0	13,000
China	1,266,838	0.08	2000	-	-	+++	n/a	0.4	61,000
Sri Lanka	18,639	0.08	2000	-	-	-	0	0	2,200
Fiji	806	0.07	1999	-	-	-	n/a	n/a	n/a
Maldives	278	0.05	1999	-	-	-	n/a	n/a	n/a
Lao PDR	5,297	0.05	1999	-	-	-	0.4	n/a	650
Philippines	74,454	0.03	1999	-	-	-	n/a	n/a	11,000
Bangladesh	126,947	0.02	1999	-	-	-	n/a	0	1,900
Mongolia	2,621	<0.01	1999	-	-	-	n/a	n/a	n/a
Bhutan	2,064	<0.01	1999	-	-	-	n/a	0	n/a

Sources: Adapted from WHO, 2001a; UNAIDS, 2000a; and United Nations Population Division data as cited in UNICEF 2001a.

¹ Prevalence of more than 1 percent

² Prevalence of between 0.1 and 1 percent

³ Prevalence of less than 0.1 percent

- : unknown or minimal HIV transmission

+ : limited HIV transmission

++ : moderate HIV transmission

+++ : major HIV transmission

HET: heterosexual transmission

MSM: men who have sex with men

IDU: intravenous drug user

ANNEX B: HIV/AIDS IN CHILDREN IN ASIA

COUNTRIES BY CATEGORY	EST. NO OF CHILDREN (0-14) LIVING WITH HIV/AIDS (END-1999)	EST. NO. DEATHS IN CHILDREN (0 - 14) (1999)	
		Low Estimate	High Estimate
High-HIV-Prevalence Countries ¹			
Cambodia	5,400	1,900	2,900
Myanmar	14,000	4,800	7,400
Thailand	13,900	4,700	7,300
Moderate-HIV-Prevalence Countries ²			
India	160,000	16,000	33,000
Papa New Guinea	220	<100	130
Malaysia	550	<100	110
Nepal	930	260	550
Viet Nam	2,500	300	460
Pakistan	1,600	450	970
Low-HIV-Prevalence Countries ³			
Indonesia	680	240	360
China	4,800	580	1,000
Sri Lanka	200	<100	<100
Fiji	n/a	n/a	<100
Maldives	n/a	n/a	n/a
Lao PDR	<100	<100	<100
Philippines	1,300	150	230
Bangladesh	130	<100	<100
Mongolia	n/a	n/a	n/a
Bhutan	n/a	n/a	n/a

Source: Adapted from UNAIDS. Report on the global HIV/Ads epidemic. Geneva. June 2000

¹Prevalence of more than 1 percent

²Prevalence of between 0.1 and 1 percent

³Prevalence of less than 0.1 percent

ANNEX C: READING LIST FOR MTCT PREVENTION IN DEVELOPING COUNTRIES

Comprehensive MTCT resource:

UNAIDS website: <http://www.unaids.org/publications/documents/mtct/index.html>

Overview of MTCT

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ANNEX D: DATA RELATED TO WOMEN'S HEALTH AND MTCT PREVENTION IN ASIA

COUNTRIES BY CATEGORY	MATERNAL MORTALITY RATIO	% OF MARRIED WOMEN AGED 15-49 CURRENTLY USING CONTRACEPTION	% BIRTHS ATTENDED BY TRAINED HEALTH WORKER
High-HIV-Prevalence Countries ¹			
Cambodia	470	22	34
Myanmar	230	33	56
Thailand	44	72	71
Moderate-HIV-Prevalence Countries ²			
India	410	41	34
Papa New Guinea	370	26	53
Malaysia	39	48	96
Nepal	540	30	9
Viet Nam	160	75	77
Pakistan	n/a	24	19
Low-HIV-Prevalence Countries ³			
Indonesia	450	55	56
China	55	91	67
Sri Lanka	60	66	94
Fiji	38	32	n/a
Maldives	350	17	90
Lao PDR	650	19	14
Philippines	170	47	56
Bangladesh	440	54	13
Mongolia	150	42	93
Bhutan	380	19	15

Source: Adapted from UNICEF, 2001a.

¹ Prevalence of more than 1 percent

² Prevalence of between 0.1 and 1 percent

³ Prevalence of less than 0.1 percent

ANNEX E: SELECTED DATA RELATED TO INFANT FEEDING IN ASIA

Countries by category	GNP per capita (US\$ 1999)	Female adult literacy rate (1995-1999)	% children (1995-2000*) who are:			% pop. using improved drinking water sources (1999)		
			Exclusively breastfed (0-3 months)	Breastfed with complementary foods (6-9 months)	Still breastfeeding (20-23 months)	Total	Urban	Rural
High-HIV-Prevalence Countries ¹								
Cambodia	260	58	16	67	54	30	53	25
Myanmar	220	78	n/a	78	75	68	88	60
Thailand	1,960	92	4	71	27	80	89	77
Moderate-HIV-Prevalence Countries ²								
India	450	44	51	31	67	88	92	86
Papa New Guinea	800	63	75	74	66	42	88	32
Malaysia	3,400	79	n/a	n/a	n/a	95	96	90
Nepal	220	28	63	63	88	81	85	80
Viet Nam	370	88	86	86	30	56	81	50
Pakistan	470	33	31	31	56	88	96	84
Low-HIV-Prevalence Countries ³								
Indonesia	580	78	52	n/a	65	76	91	65
China	780	77	64	n/a	n/a	75	94	66
Sri Lanka	820	88	24	60	66	83	91	80
Fiji	2,210	89	n/a	n/a	n/a	47	43	51
Maldives	1,160	99	8	n/a	n/a	100	100	100
Lao PDR	280	48	39	n/a	57	90	59	100
Philippines	1,020	94	47	n/a	23	87	92	80
Bangladesh	370	48	53	n/a	n/a	97	99	97
Mongolia	350	97	93	84	74	60	77	30
Bhutan	510	28	n/a	n/a	n/a	62	86	60

Source: Adapted from UNICEF, 2001a.

¹ Prevalence of more than 1 percent

² Prevalence of between 0.1 and 1 percent

³ Prevalence of less than 0.1 percent